The Southern Surgeon

Subscription in the United States, $4.00

Vol. VII, No. 6

December, 1938

STUDIES OF THE ADRENALS BY X-RAYS IN ADRENAL-GENITAL SYNDROMES

GEORGE F. CAHILL, M. D.

New York

THE recent advances in biochemical methods have unfolded many discoveries of the functions and relationships of the glands of internal secretion. Of especial interest to the clinician have been the remarkable endocrine syndromes, caused by excessive or perverted functions of these glands. The surgeon is aware of the possibility of the service he may render in such conditions especially when the syndrome may be associated with an endocrin-functioning tumor. There is also the additional interest in the attempt to reduce or change the excessive or altered function of these glands by operative means, when no tumor can be shown. Among such changes of the endocrine balance, the cortex of the adrenal with tumor formation and probably with excessive or altered secretion, when no tumor may be shown, are associated with bizarre endocrine manifestations. These have been described as the adrenal-genital syndrome.

This syndrome, it has been shown, has been caused in some cases by a tumor of the cortex. However, tumors of the cortex have occurred without recognized endocrine manifestations. In addition somewhat similar syndromes have occurred with tumors of the pituitary, pineal, thymus, testis, and ovary. Again, like symptoms have occurred without any demonstrable tumor and in such cases there appears to be only limited information as to the mechanics involved.

From the J. Bentley Squier Urological Clinic, Columbia-Presbyterian Medical Center, New York City.

Read before the Postgraduate Surgical Assembly, the ninth annual meeting, of The Southeastern Surgical Congress, Louisville, March 7, 8 and 9, 1938.

I wish to express my appreciation to Dr. J. Bentley Squier for his encouragement and to Miss C. McCoy and her staff of the Squier Urological Clinic, X-Ray Department, for their careful cooperation.

When the adrenal-genital syndrome is present, the endocrine changes appear to be in three more or less separate paths. The most frequent occurrence is in the female. It is characterized by changes in the secondary sexual characteristics: that is, a suppression of femininity occurs with alterations towards adult masculinity, best termed androtropic. Rarely, a similar tumor may occur in the male with inversion changes towards femininity, or gynecotropic. The second

Fig. 1. An adult male, aged 32, with pain in left flank due to a large left adrenal cortical tumor and without endocrine manifestations.

type of changes are those towards maturity in the young and the appearance of more advanced age than expected in the adult. The third type exhibits disturbances of metabolism, somewhat similar to that described as Cushing's syndrome; among the various disturbances of metabolism the most marked are in the plasma, the fat distribution, the skin, and in the psychologic balance. Since similar syndromes have now been shown to occur more frequently without tumor, for these up to the present, the most assignable cause has been some adrenal cortical hyperactivity.

For the differential diagnosis between tumor and non-tumor cases in such syndromes, a method of visualization of the adrenal by x-ray

is presented. Ordinary x-rays have shown tumors or suggested enlargements of the adrenal, either because of the density of the mass or through displacing some dense shadow producing organs, as the kidneys. The first use of gas mediums in the perirenal fascia in order better to visualize the planes and produce more contrasting shadows was by Carelli[1] in 1921. This was followed by a number of reports. Langeron[2] in 1929 was the first to use intraperitoneal air to visualize an adrenal tumor by x-ray. Roux-Berger, Naulleau and Contiates[3] in 1932, diagnosed a cortical adrenal tumor by aorto-

Fig. 2. Air injection x-ray of Case 1. Showing the large rounded adrenal tumor in front of the left kidney and arising from the lower pole of the adrenal. Proved by operative removal. Recovery.

graphic x-ray using the method of Reynaldo dos Santos. Since 1930 we have used a modified method of Carelli. This we have described in previous reports,[4,5] and in order to demonstrate the adrenals and if possible to determine from the shadows whether any pathologic change is present or whether there is a normal appearing adrenal shadow. With increasing experience we have modified the amount of air and its rate of introduction according to the type of case. Some such modifications have also been described by Mencher[6] in 1937, who used perirenal insufflation in the study of the adrenal in general investigation of the endocrine system.

A description of the procedure is as follows:

With patient on the side and a pillow under the opposite flank, the upper flank is sterilized. An area below the twelfth rib and between the outer border

of the erector spinae muscle and the reflection of the peritoneum is injected with a dermal bleb of procaine and the subcutaneous tract injected. A lumbar puncture needle is then introduced and as it passes through the transversalis fascia a change of resistance is noted and it enters the perirenal fascia. The needle is aspirated to assure avoidance of a blood vessel and then attached to a sterile tube with sterile cotton filter and an inflatable rubber bag. Between 250 and 500 c.c. of air is then slowly forced by hand through the cotton and

Fig. 3. A case of adult virilism in a boy of 11 years. Showing shortening of the extremities due to absorption of the epiphyses. Air injection x-rays show large right adrenal. No operation permitted.

needle into the perirenal fascia. In the proper plane it almost falls in so little pressure is necessary. A deep sense of fulness by the patient in the flank is assurance that the proper planes have been reached. A film is then taken and the air localized. It then may be displaced upwards by manual pressure or by rowing motion as described by Mencher. The air slowly diffuses and series of films are taken for 24 hours. The air may pass up through the mediastinum to the neck or may descend down the psoas to the thigh, and takes from 6 to 10 days to absorb.

The value of such a procedure can be estimated only after its use in a considerable number of cases. Since 1930 at the Squier Clinic there have been 57 cases of either adrenal cortical tumor or of the adrenal-genital syndrome, 55 of which have had bilateral "airo-

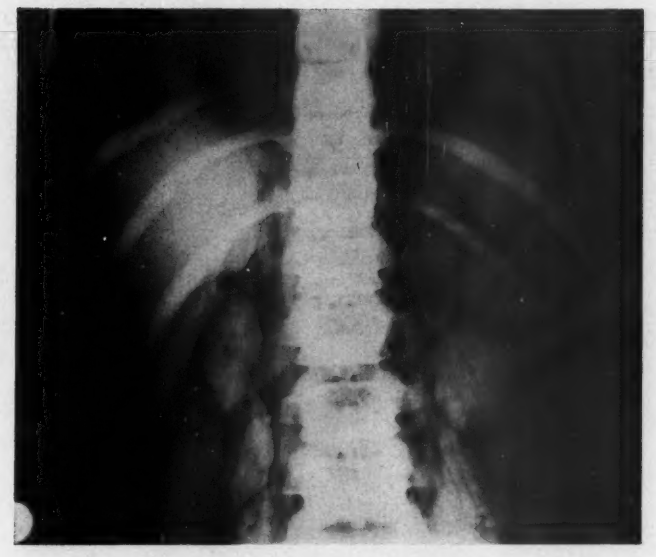


Fig. 4. Air injection x-ray in a boy of 6 with adult maturity. Shows large left adrenal and normal appearing right. No operation, the patient is still under study.

Fig. 5. Air injection x-ray of man of 40 with obesity, atrophy of the testis and psychologic changes. Showing bilateral enlargement of the adrenals. No operative procedures done.

grams." In addition we have used this procedure in other adrenal conditions and for various obscure renal and other abdominal conditions in over 130 cases.

A study of these perirenal air injections in adrenal cortical lesions is presented, with the types of shadows demonstrated, and their evaluation with the symptoms and operative findings. Of the 55 cases injected, there were 7 males and 48 females.

Fig. 6. A woman of 40 with "Cushing's" syndrome, mostly of metabolic changes in plasma, fat distribution, skin and in the psyche. She shows face, neck, breast and abdominal fat, thin arms and legs, abdominal stria and with moderate hirsutism.

Among the 7 males was an adult case without demonstrable endocrine symptoms (fig. 1) that showed a rounded shadow in front of the left kidney and apparently connected with the lower end of a long thin adrenal (fig. 2). Such shadows were confirmed by operative removal. There were two children both with macrogenitosomia praecox, one (fig. 3) with a shadow showing a possible tumor in the right adrenal and the other with a marked hypertrophy of the left adrenal (fig. 4). No operative confirmation has been made as yet in either case. There were two additional children with macro-

genitosomia praecox in whom air insufflation showed apparently bilateral normal adrenal shadows. Two adult males with most excessive hair distribution showed normal adrenal shadows. One case of adult male with some feminization and obesity showed shadows of bilateral adrenal enlargement (fig. 5). In these males 250 c.c. of air diffused well in the children and the 500 c.c. in thinner adults. In the one obese male the air was more mottled and gave poorer pictures of the tissue planes.

In the 48 females there was one tumor with only masculinizing and maturity syndromes, and little or no other metabolic changes.

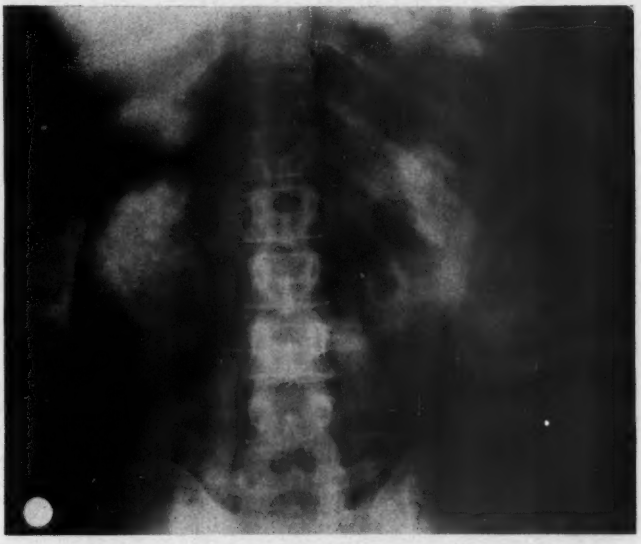


Fig. 7. Air injection x-ray of Fig. 6 showing air around the right kidney, in a crescent horn around a mass (adrenal) above the kidney. Such shadow occurred with carcinoma of the adrenal.

She showed on 250 c.c. air injection a large, rounded tumor above the left kidney and a normal adrenal shadow in the opposing side. Air injection x-rays taken one month after removal of the tumor showed an apparent hypertrophy of the remaining adrenal. There were five masculinizing and metabolic tumors in adult females. One, a large carcinoma, showed air spreading in a crescent above the kidney and not diffusing above the tumor. This was confirmed by operation and the adherence of the tumor to the liver revealed why the air did not diffuse above the tumor. Another smaller carcinoma case showed 300 c.c. of air diffusing around a right adrenal tumor and a tiny opposing adrenal. Operative removal confirmed the presence of the tumor; death from adrenal collapse in 32 hours confirmed

the atrophy of the remaining adrenal. A case of slight masculinizing and with marked changes in metabolism (fig. 6), like Cushing's syndrome, showed a mass above the right kidney resembling our large carcinoma of the adrenal (fig. 7). The diffusion of air in such cases is mottled and less clear than in normal, and this we explain as due to the fibrosis and other changes in the fat of the perirenal fascial planes. This case was not confirmed by operation, her psychologic state preventing cooperation. Another case (fig. 8)

Fig. 8. A woman of 27, with a depression psychosis and marked metabolism changes with slight masculinization from tumor of left adrenal cortex. Removed by operation.

of marked metabolic changes with psychosis showed the air diffusing poorly around a left adrenal tumor and an apparently normal sized right adrenal (fig. 9). The tumor was removed from a fibrotic perirenal fascia. Death occurred in 26 hours from adrenal failure; at autopsy the presence of the opposing adrenal was confirmed but on section it was found to be atrophic, a condition that frequently occurs in these metabolic type adrenal cortical tumors.

Thirty females, presenting mostly the symptoms of androtropic changes, hirsutism and menstrual disturbances, had bilateral peri-

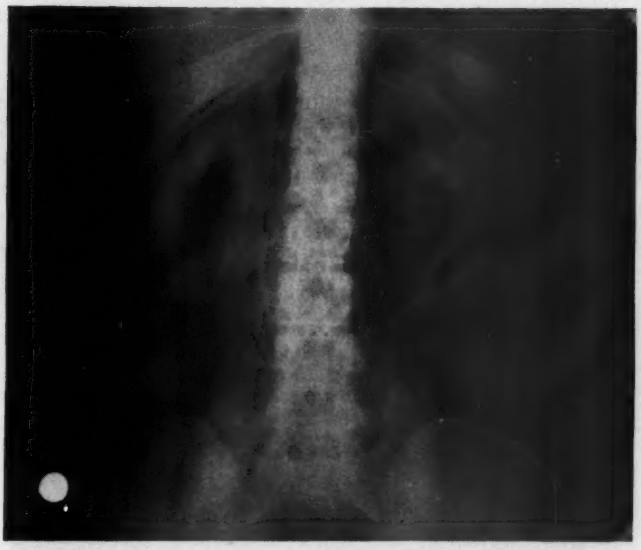


Fig. 9. Air injection x-ray of Fig. 8 showing the irregular spotting of air in Cushing's syndrome but still showing a left adrenal tumor and a normal appearing right adrenal.

Fig. 10. The normal appearing right adrenal shadow in a case of the syndrome without tumor. The adrenal is long and narrow.

renal air injections. As a rule the adrenals of these cases were clearly shown. The right adrenal casts more often a long thin shadow (fig. 10) and the left more frequently a wedge shape (fig. 11). At times from a series of films, taken during the 24 hours, as the air diffused a composite impression was obtained of the adrenal. We were not able to interpret the shadows of any of these adrenals as tumors. Five (figs. 11 and 12) of the more marked cases were selected and at operative exposure, adrenals similar to the x-ray shadows were disclosed (fig. 13). Sections of removed parts of these adrenals showed no tumor.

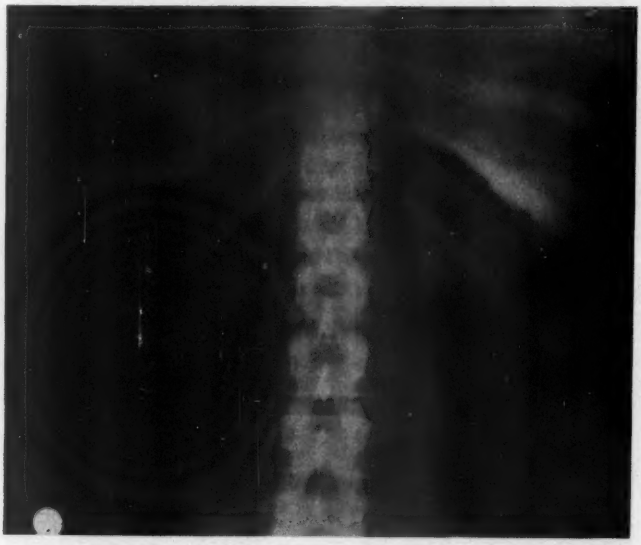


Fig. 11. The normal appearing left adrenal shadow, usually more wedge shaped than the right.

Twelve females presenting androgenic and metabolic changes had bilateral perirenal air injections. Among these some were very obese, one of 365 pounds requiring an especially long needle to reach the transversalis fascia. After 500 c.c. of air was injected on both sides, a bilateral hypertrophy of the adrenals was shown by x-ray. Exposure of these adrenals was most difficult when a partial adrenalectomy was performed. One patient who showed apparently little change in her adrenal shadows had extraordinary amounts of male sex hormone properties in her urine, more, in fact, than found in most tumor cases. In several, it was impossible to determine clinically or by urinary hormonal studies whether an adrenal tumor was present or not, and from our x-ray studies and exploratory operations we are apparently only able to make such determination from the

air injection x-rays, even though the air diffusion is poorer and resulting shadows are less clearly defined, than in the less obese androtropic cases.

There were 8 cases in this series in which adrenal shadows appeared only upon one side. There were very little reactions from the air injections among these adrenal cortical cases, with the exception

Fig. 12. A characteristic masculine young woman with the adrenal cortical syndrome and with no other metabolism changes. There was no tumor of any endocrine gland, demonstrable by x-ray or operation. Condition improved with diminution of the amount of adrenal cortex by operative section.

of nervousness in those with psychologic upsets. The distention pain in the side was transient. There were no infections, no hematomas, and no air emboli. Such have been reported in the procedure when used in some disseminating malignancies in which the dilated vessels are easily damaged and air infused.

SUMMARY

The injection of air in the perirenal fascial spaces visualizes the adrenals so that their shadows may be observed, and some anatomic or pathologic conclusions made. This is the best method up to the

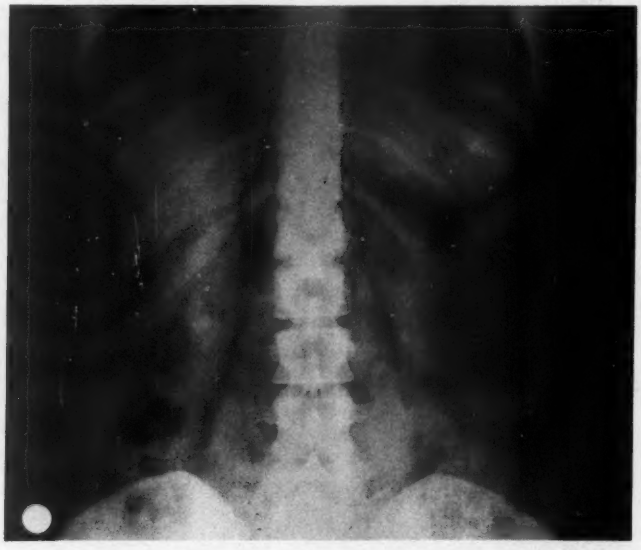


Fig. 13. Bilateral air injection x-ray of female in Fig. 12. Showing apparently normal adrenal shadows.

present, to evaluate the adrenals in suspected adrenal disease. Normal appearing adrenals in thin individuals appear to show the clearer shadows. Encapsulated tumors in thin individuals are also clearly shown. In obese cases and especially in the adrenal-genital syndrome where metabolic changes occur, resembling the Cushing's syndrome, adrenal tumors or normal adrenals are not visualized as clearly on account of the fat or fibrotic changes in the perirenal fascia. Such cases, however, may have the adrenal shadows determined by a composite from a series of succeeding films as the air gradually diffuses in the succeeding 24 or 48 hours after injection. This method done carefully and with the proper technic is apparently not hazardous in these adrenal cortical cases.

121 East Sixtieth Street

REFERENCES

1. Carelli, H. H., and Sordelli, E.: Rev. de l'Assoc. Med., Argentine *34:* 424 (June) 1921.
2. Langeron, L.; Dercherf, E., and Danes: Bull. et mém. Soc. Med. d. hôp. de Paris *45:* 436, 1929.
3. Roux-Berger, J. L.; Naulleau, J., and Condiates, X. J.: Bull. et mém. Soc. Nat. de Chir. *60:* 791, 1934.
4. Cahill, G. F.: J. Urology *34:* 238 (Sept.) 1935.
5. Cahill, G. F.; Loeb, R. F.; Kurzrok, K.; Stout, A. P., and Smith, F. M.: Surg., Gyn. & Obst. *62:* 287 (Feb. No. 2A) 1936.
6. Mencher, W. H.: J. A. M. A. *109:* 1338 (Oct. 23) 1937.

THE ADVANTAGES OF PERINEAL URETHROTOMY IN PROSTATIC RESECTION

REED M. NESBIT, M. D.

Ann Arbor, Mich.

THE past decade has seen the development of instruments which have enabled surgeons successfully to remove prostatic obstructions in a manner entirely impossible heretofore. Transurethral prostatectomy during this period has become an accepted procedure by urologists the world over. To be sure, all genito-urinary surgeons have not agreed as to the indications or limitations of the operation. Some few able men have advocated this method in all cases—other equally able men have felt that the operation should be utilized in only small median lobe hypertrophies and vesical neck contractures. No doubt these divergent opinions are based upon the experiences of men whose technical abilities are vastly dissimilar. All agree that the operation is sound in principle where properly employed in selected cases. I believe I share the opinion held by the majority that transurethral resection is indicated in those cases where a complete removal of abnormal tissue can be accomplished. The mere channelization or "revision" of the prostatic urethra is certainly inadequate and unsound. Recurrent obstruction, persisting abnormalities of urinary function, urinary sepsis resulting from sloughing septic infarcts, and recurrent delayed hemorrhages are but a few of the unhappy sequelae of an incomplete transurethral prostatectomy. Certainly a complete transurethral prostatectomy provides an ideal functional result with a minimum of postoperative morbidity and mortality, and a shorter period of hospitalization than any other operation offers. I believe most urologists will agree that the results of this operation when properly performed within the limitations of the surgeon as well as the limitations imposed by the size of the gland, approach upon the ideal. Each surgeon performing this operation must necessarily recognize the limits of his own dexterity and perform transurethral resection in only those cases where he can expect to perform a more or less complete prostatectomy. Other cases he should reserve for more appropriate procedures. His dexterity, skill and experience may warrant his performing resection in 100 per cent of cases, or perhaps only 10 per cent. In either case his sound judgment must be borne out by his good results.

However the ultimate result of a perfectly performed resection has been occasionally marred by the development of urethral stric-

---

From the Department of Surgery, University of Michigan, Ann Arbor, Michigan.

Read before the Postgraduate Surgical Assembly, the ninth annual meeting, of The Southeastern Surgical Congress, Louisville, March 7, 8 and 9, 1938.

ture. This unhappy sequela has been observed by all resectionists who have checked up upon their patients, but has received practically no recognition in the literature. Resectoscopes must of necessity have sheaths of large caliber, most instruments in common use being 28 or 30 Fr. in size. All male urethras do not possess this caliber.

In some instances the urethra is normally small, some have a small caliber because of previous disease, while many are limited in size because of a loss of elasticity which the urethra shares with other tissues in later life. It has been the practice of resectionists to dilate such urethras until they could accommodate the resectoscope. Some have even performed internal urethrotomy to attain desired accommodation for large instruments. In either event the dilatation has amounted in fact to rupture of the urethral mucosa which can only result in stricture. These injuries invariably occur in the pendulous urethra and at the penoscrotal angle where strictures are prone to contract rapidly and are notoriously difficult to dilate. The anticipated success of resection has doubtless led to the occasional unwarranted disregard of the urethra, and to irreparable insult in some.

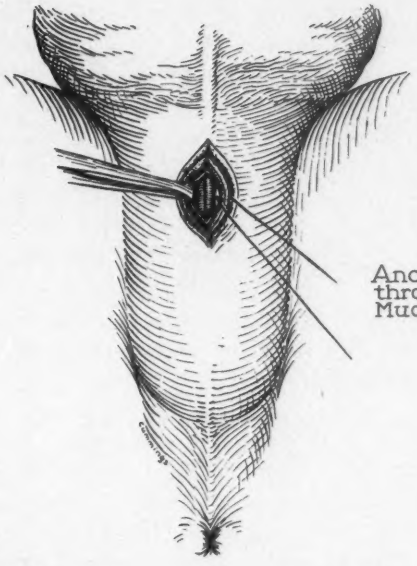
Bumpus aptly remarked that one had better perform some other type of prostatectomy than do a successful resection and then leave the patient with a lesion of the urethra infinitely more debilitating and difficult to treat than his prostatism.

About a year ago Hugh Cabot suggested a method of averting this disaster to his colleague Thompson who subsequently reported its use in one case.[1] In discussion of Thompson's report Cabot said,

> There appears to be no doubt that stricture of the urethra and peri-urethral abscess with resulting fistula, most commonly at the penoscrotal angle, have been more than occasional complications of transurethral prostatectomy. It is of interest to recall that more than sixty years ago Bigelow encountered the same problem in his masterly reorganization of the operation of lithotroty which he transformed into litholapaxy. He insisted that large instruments were essential to success. Commonly enough, these could be passed but he laid down in one of his earlier papers the doctrine that in the presence of stricture of the urethra, litholapaxy should be done through a perineal urethrotomy and not through a divulsed urethra. Therefore, I make bold to suggest to the gentlemen of Doctor Thompson's generation, who are developing the operation of transurethral prostatectomy, that they abandon preliminary dilatation of the urethra, that, if the instrument will not pass without requiring anything more than a meatotomy and will not pass without difficulty, they will be well advised to resort to a perineal boutonnière through which to carry out their operation. This wound will require no sutures, will not prolong convalescence and injury to the anterior urethra will be avoided.

Following the enunciation of these sound principles we have employed perineal urethrotomy in all cases where the urethra has not easily admitted the free passage of a No. 30 F. steel sound. We

have also found it preferable to perform this simple procedure rather than meatotomy since the most carefully managed meatotomy wound occasionally produces stricture. Also in a few rare instances where unusual maneuverability of the instrument was desired in excessively long prostates we have elected to make this approach even though the urethra could have easily accommodated the resectoscope.



A simple method of performing this procedure consists of introducing a grooved sound of No. 20 Fr. caliber into the urethra. Gentle pressure upon the handle of the sound allows its curve to project into the perineum where it can be grasped along with its overlying structures by the thumb and index finger of the left hand. An incision 2 cm. long is now made which passes directly down upon the sound. The cut edges of the urethral mucosa along with full thickness of the bulb are grasped in Allis forceps and transfixed by anchor sutures. Through this incision the resectoscope sheath is easily and safely introduced. At the end of operation the catheter or Foley bag may be introduced either through the incision or through the entire urethra depending upon the amount of pre-existing urethral disease. In many instances we have felt it desirable to avoid the danger of catheter trauma in cases showing inflammation of the pendulous urethra and have brought the catheter out the perineal wound. In those cases where urethral catheter drainage has been employed a small gauze pack has been introduced into the

wound and left in 24 hours. This affords hemostasis when slight bleeding occurs and prevents too rapid closure of the skin with resultant danger of wound abscess formation.

Urethrotomy has been done in 31 of the last 240 prostatic resections performed at the University Hospital. In none of these cases has the procedure resulted in complications that have in any way contributed to postoperative morbidity, or discomfort to the patient. Upon removal of the catheter all but two patients have voided part of their urine from the incision. Many have had completely healed wounds in three days. The longest period of perineal drainage was fifteen days. Complete wound healing occurred on an average of nine days after operation.

Postoperative check-up examinations on the majority of these patients at one and two months have invariably shown absence of any evidence of stricture in the region of the bulb and in most instances one can scarcely see or feel any evidences of the urethrotomy scar.

During the eight months period during which we have employed this procedure we have encountered no immediate or late urethral complications of any sort.

The use of perineal urethrotomy would permit the safe use of instruments of considerably larger size than now available, since the bulb and membranous urethra have a lumen considerably larger than 30 Fr. Such instruments would be advantageous in many instances where rapid resection or removal of large amounts of tissue were necessary. We have already been assured that such additions to our armamentarium will be available within the near future.

It appears then that perineal urethrotomy offers a safe method whereby the urethra can be entered behind its normal points of narrowing, thus avoiding the dangers of traumatic injury to the anterior urethra. This procedure shows to advantage not only in preventing stricture in the abnormally small urethra, but also in allowing an increased maneuverability of instrumentation in excessively long prostatic enlargements. It further promises to decrease the limitations upon prostatic resection by allowing the advantageous use of larger instruments.

REFERENCE

1. Thompson, G. J.: Perineal Prostatic Resection, Proc. Staff Meet., Mayo Clinic *12:* 360 (June 9) 1937.

SOME CONSIDERATIONS ON WOUND HEALING

W. D. Gatch, M. D.
Indianapolis

SURGERY is but the science of wounds. Wound healing is the most ancient and is still the most important study of the surgeon. It should include both the immediate and the remote effects of wounds. Interest in wound healing languished for a while after the introduction of aseptic technic and of reliable methods of hemostasis. These advances led the surgeon to take for granted the primary healing of operative wounds, and produced an over-confidence in surgical treatment which is only now being corrected. The World War, the automobile and modern industry have caused a great increase in the number of accidental wounds. The treatment of these injuries, always infected or in danger of becoming infected, and often demanding plastic operations, has revived interest in the whole subject of wound healing. In fact, traumatic surgery is the only kind of surgery which is not decreasing in volume and in which rapid improvements in treatment are being made. Its development has had a highly beneficial effect on all other branches of surgery.

I have written only on certain important aspects of this subject and have made no attempt to give a systematic discussion of the subject of wound healing.

Open Treatment of Accidental Wounds

It is commonly taught that all accidental wounds are contaminated, and that they are in general infected when they have gone untreated for more than eight hours. In the stage of contamination, bacteria are lying on the wound surfaces and can be removed therefrom by mechanical means. In the stage of infection, bacteria have multiplied and penetrated the tissues so that their mechanical removal is no longer possible. It is obvious that the golden time for treating accidental wounds is in the period of contamination.

To Lister and to his immediate followers, the seed of infection was more important than the soil upon which it grew. At present our view is almost the exact opposite of this, namely, that the most important factor in the prevention and conquest of infection is the condition of the tissues. Without bacteria there can, of course, be no infection, but the presence of bacteria in the tissues will not necessarily lead to infection, provided the tissues are in a healthy condition. It is probable that some bacteria contaminate every wound,

---

Read before the Postgraduate Surgical Assembly, the ninth annual meeting, of The Southeastern Surgical Congress, Louisville, March 7, 8 and 9, 1938.

whether it be accidental or operative, no matter how elaborate may be the technic employed to remove them or to prevent their entry. Our effort in the treatment of contaminated wounds should consist in the removal of as many bacteria as possible without inflicting any injury upon the tissues which can impair their power of resistance. The treatment of accidental wounds by dousing them with tincture of iodine, bichloride of mercury or one of the newer antiseptics, is still too often practiced. Except in very special cases, we should treat no contaminated wound with antiseptics. No antiseptic has ever been devised which is not on the whole more injurious to the tissues than to the bacteria. Antiseptics quickly lose their bactericidal power when mixed with body fluids. Therefore, if an antiseptic does not destroy practically every bacterium in the wound, it simply creates a pabulum of dead tissue on which bacterial growth can flourish. Tincture of iodine is perhaps the most dangerous antiseptic which can be applied to a wound. In contact with body juices it has slight bactericidal action, and it injures the tissues with formation of a scab under which bacterial growth can flourish with disastrous results. Fingers and hands are lost because of treatment with iodine of trivial cuts. If the cut finger be placed under running water, the wound held open and thoroughly washed out, hemorrhage encouraged, the finger cleansed with soap and covered with a sterile, dry dressing, the wound will nearly always heal without even becoming sore.

We now know that the tissues of healthy persons may harbor bacteria, especially anaerobic organisms akin to the Welch bacillus.[1] These may proliferate after injuries. Thus is to be explained the formation of gas in the tissues after simple fractures or other lesions in which the skin is not broken.

The mechanical cleansing of a large accidental wound cannot be carried out except in a well equipped operating room. The treatment of accidental wounds by radical debridement seems to have been abandoned, because it is unnecessarily mutilating, because it is often inapplicable, and because it gives no better results than simpler methods.

The method of wound sterilization most widely used today may be described as a process of fractional sterilization.[2] First, the skin around the wound is shaved and thoroughly scrubbed with soap and water. If it is covered with grease this can be most easily removed with a mechanic's soap of some kind. After this shaving and scrubbing of the skin the wound is inspected and all visible foreign material picked out of it or removed by irrigation with normal salt solution. The wound is then surrounded by sterile towels, and with aseptic technic, the process of removing all foreign material is con-

tinued. At this stage of the cleansing, dead tissue is cut away and bleeding vessels accurately tied with very fine catgut. It is a good rule to cut away all filaments of tissue which float in the irrigating fluid. After this second cleaning the operator changes his gloves and a third time explores every recess of the wound, irrigates it again with normal salt solution and removes any more devitalized or suspicious looking tissue he finds. The wound after this may be either closed very loosely with skin sutures or left wide open without suturing of any kind until all danger of infection has passed. In certain sites, for example the face, experience teaches us that it is perfectly safe to suture the cleansed wound so as to prevent an unsightly scar. On other parts of the body, however, any attempt at closure is often unwise, and the open treatment is wonderfully successful. Orr has demonstrated its value in compound fractures.[3] The tight closure of accidental wounds of the scalp is fraught with the danger of widespread subcutaneous sepsis and intracranial abscess. If the skin around the wound be shaved, the wound cleansed as well as possible, and left open, it will heal with practically no more scar tissue than if sutured.

Most accidental wounds are treated under emergency conditions—in physicians' offices and private homes—where it is practically impossible to free them completely from contaminating organisms. If the general practitioner could be induced to cleanse these wounds, not to treat them with antiseptics, and not to suture them, I am convinced that there would be far fewer deaths and far less permanent disability following accidental wounds than at present.

Edema During and After Wound Healing

Edema delays or prevents wound healing and may be a disabling complication thereof. The causes of edema were not clearly understood until Starling discovered that the blood proteins—fibrinogen, serum albumin and serum globulin—exert an osmotic pressure.[4] This ranks in importance next to the discovery of the capillary circulation. It enabled Starling to formulate his theory on the interchange of water and solutes between the blood and the tissues, which has been of immense value to clinical medicine. Surgeons have been slow to apply it in the study of surgical lesions. Before discussing the effect of edema on wound healing, it may not be amiss to state this fundamental conception of Starling's. In the diagram, Figure 1, C represents a blood capillary, L, a lymph capillary, TS, tissue spaces. The blood flowing through C exerts a mechanical pressure on the wall of C which tends to force water out of C into TS. This outward passage of water is resisted by the osmotic pull of the blood proteins which tends to draw water from TS into C. The wall of

C is perfectly permeable to water and solutes, but practically impermeable to the colloidal proteins. At the arterial end of C, the hydrostatic pressure exceeds the osmotic pull, and water passes from C into TS. At the venous end of C the osmotic pull exceeds the hydrostatic pressure and water passes from TS into C. The function of the lymph capillaries is to remove proteins and particulate matter, including bacteria, from the tissue spaces.

Edema may be caused: (a) By venous obstruction which raises the pressure in C and promotes the filtration of water and opposes its re-absorption. (b) By damage to the endothelial wall of C which makes it more easily permeable. (c) By obstruction to the lymphatic flow so that L does not remove protein matter from the tissue spaces. Injury to the endothelium of C may permit the passage of proteins into the tissue spaces. These elevate the osmotic pressure in the tissue spaces and decrease the re-absorption of water by C. We have a ready means of determining whether, in a given case, edema is due to venous or to lymphatic obstruction. In the former case the edema fluid will have a low, and in the latter case a high, protein content.

The presence of edema delays wound healing by preventing an orderly interchange of nutrient material and waste products between the blood and tissue cells. The legs, even of healthy people who remain for some time in the standing posture, have a slight edema because of the hydrostatic pressure of the blood in the veins of the legs. In elderly people this edema is often sufficient to delay wound healing indefinitely. I once excised a small, pigmented mole from the leg of an elderly man. Greatly to my embarrassment the wound failed to heal. It was too trivial an affair to put the man to bed. I finally observed that the extremity was slightly edematous. I therefore applied a pressure bandage to the entire leg, and was delighted to see the wound heal in a few days. Following this experience, I was consulted by a young man who had a fungus infection of his legs. This had been treated by irradiation and by ointments, but the legs had failed to heal. Both were swollen and covered with shallow ulcers, almost from the knee to the ankle. This condition had persisted for over a year. Loss of both legs was feared. By the use of pressure bandages I was able to bring about firm and permanent healing of these ulcers in a few weeks.

In a recent issue of the British Journal of Surgery is an important article on the "Swelling of the Upper Limb Following Radical Mastectomy," by Devenish and Jessop.[5] These authors state that this swelling occurs in about one out of every six patients who have had a radical mastectomy, and that it is very severe in about one

out of six cases in which it occurs. They make no positive statement in regard to its etiology. Halsted suggested that infection is the underlying cause, but this did not seem to be so in the cases of Devenish and Jessop. They have treated these swollen arms by vertical suspension of them over a period of from four to ten weeks. By immersing the arm before and after treatment, they demonstrated in one case a loss of three liters of fluid in fifteen days. After an arm had been reduced in size, they applied a laced bandage to it.

I have been interested in the treatment of these swollen arms for a long time, and I have found that the swelling can be prevented by early treatment. This consists in the repeated application of a compressing bandage from the fingers to above the elbow. The bandage is applied as tightly as the patient can endure it, for about 10 minutes and then removed. The arm is next massaged. Then the band-

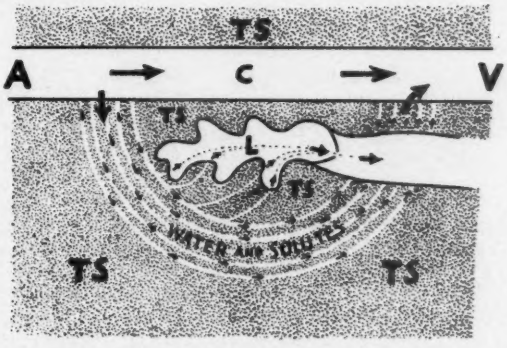


Fig. 1. Diagram illustrating Starling's theory.

age is applied as before for about 10 minutes, etc. By persistent use of this method I have been able to cure very severe cases. If the arm is allowed to go untreated for a long time, an enormous amount of scar tissue forms in its subcutaneous spaces and treatment is then very unsatisfactory. I am inclined to believe that the swelling of these arms is due partly to lymphatic, but chiefly to venous obstruction, although I have never analyzed a sample of fluid from one of them. The action of the bandage in removing edema fluid can be easily explained by use of the diagram illustrating Starling's theory. The bandage raises the pressure in the tissue spaces and by this means compresses the capillary, C. We have shown that when this occurs the blood pressure in the capillary will increase until it equals the pressure in the tissue spaces.[6] It is evident that hydrostatic pressure in this event cannot force water either into or out of C, but that the osmotic pull of the blood proteins in C can draw water into it. This explains how the pressure bandage reduces edema caused by venous obstruction.

The edema caused by lymphatic obstruction is due to the accumulation of protein material in the tissue spaces. The osmotic pressure exerted by this material will hinder or prevent the reabsorption of water by the blood capillaries. Increasing the pressure in the tissue spaces will empty the lymph capillaries and enable them to resume the removal of proteins from the tissue spaces. Drinker and Field[7] have shown how extremely difficult it is to produce enough obstruction of the lymphatic drainage of an extremity to cause edema thereof. Their observations make it seem improbable that lymphatic obstruction is a common cause of edema involving an entire limb. Since the movement of lymph is due to its propulsion past successive valves in the lymphatics by forces which compress these vessels, it is evident that intermittent pressure is superior to continuous pressure in overcoming lymphatic stasis. Because the intravenous pressure of a bandaged extremity equals the pressure in its tissue spaces,[6] provided that this is lower than the systolic blood pressure, it follows that by bandaging a limb we can increase the pressure in its veins and thus force the development of better venous outlets. Theoretical considerations and clinical results make it seem probable that new outlets for lymph can be developed by intermittent pressure on a limb.

It is well known that an edematous extremity is liable to recurrent attacks of erysipelas. These can be prevented by the continuous use of the pressure bandage.

Edema, associated with infection, is believed to be due to injury of the capillary endothelium. This permits the escape of the blood proteins into the tissue spaces. Here they elevate the osmotic pressure and prevent the absorption of water by the capillaries. This mechanism is designed to limit the spread of infection and the absorption of toxic material from infected tissues.

Bacterial Invasiveness

Menkin[8,9] has reported some observations on bacterial invasiveness which are of so great practical importance that a general knowledge of them by clinicians is desirable. He observed: (1) That when Trypan blue is injected into the normal skin of an experimental animal, it is quickly absorbed by the lymphatics and carried to the regional lymph glands. (2) That if Trypan blue is injected into an inflamed area it does not enter the lymphatics at all. This is true whether the inflammation is produced by the injection of chemical irritants or by the staphylococcus or its toxins. (3) That Trypan blue injected intravenously accumulates in the tissues of an inflamed area. The same is true of bacteria injected intravenously. This is

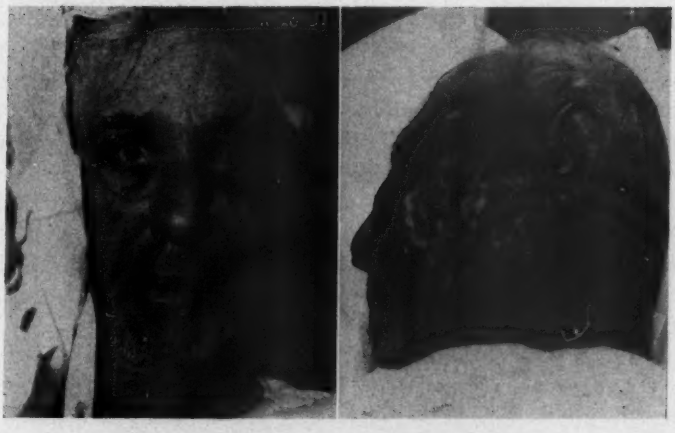


Fig. 2 a. Carbuncle of the face, before treatment.

Fig. 2 b. After defect (shown in Fig. 2 a) in skin had been cured with thick Thiersch grafts.

an explanation of the well-known tendency of infection to occur in a place of lowered resistance. On the basis of these observations Menkin advances an explanation of the differing behavior of infections due to the staphylococcus and the streptococcus. Staphylococcal infections are well known to remain localized, whereas the streptococcal infections spread widely. When Menkin injected staphylococci subcutaneously he found that Trypan blue injected into the same area after a short interval of time was fixed there. When he injected streptococci, however, he found that Trypan blue injected later was not fixed in the inflamed area, but continued to reach the regional lymph glands for as long a period as two days. He explains

these findings as being due to the violent reaction on the tissues of the exotoxin of the staphylococcus which injures the endothelium of the vessels and produces clotting in the tissue spaces and thrombosis of the lymph vessels. The streptococcus, on the other hand, has no such violent toxic action on the tissues, so that lymphatic drainage of the inflamed area is not blocked. This permits the infection to spread. We therefore have the paradoxical result that the staphylococcus produces a mild systemic reaction because it is so violently toxic, whereas the streptococcus produces a violent systemic reaction because it is so mildly toxic. Menkin[9] showed also that the experimental animal can be saved from death after subcutaneous injection of a lethal dose of pneumococci if staphylococci are injected at the same time. He disagrees with the idea that the streptococcus spreads because it can dissolve clotted fibrin in lymph vessels. He has shown that in infections, phagocytosis is absent at first. The preliminary reaction is one of exudation only. After a few hours granulocytes appear in the wound, only to be replaced later by macrophages.

Menkin has shown that inflammation produces an increased permeability of the endothelial cells of the capillaries[9] as well as a blocking of the lymphatics. This is why bacteria or dyes injected intravenously accumulate in an inflamed area. It is also a possible explanation of the phenomena of Arthus and Swartzman. Thus, after the injection of a bacterial toxin, or chemical irritant into the tissue, the endothelium of the blood vessels becomes more permeable. If later, bacteria or toxic colloidal materials be injected intravenously, they will pass through the damaged capillary endothelium and produce violent inflammation and sloughing. Menkin's results explain why it is so unwise to incise a recent infection. His ideas are in complete harmony with certain clinical results which have been obtained by the prophylactic induction of inflammation in the peritoneal cavity, the pleural cavity or joints.

Resistance of Recent Wounds to Infection

An experimental wound made under aseptic precautions is very easily infected. With the passage of time, however, the ease of infection decreases, until the sixth day, after which infection is practically impossible. This resistance is due to the development of a defensive layer of granulation tissue. These facts teach us that once we have thoroughly cleansed and dressed an accidental wound we had best leave the dressing unchanged for as long a time as possible, up to at least six days.

The Beneficent Action of Pus

We laugh at our predecessors because they spoke of laudable pus. A study of the origin and function of pus, however, shows that their conception of its purpose was well founded. A patient is liable to be overwhelmed by infection in the early period after receiving an accidental wound. If he weathers this period, a reaction occurs in the wound, attended by the formation of pus, and he will probably

Fig. 3. Foul and redundant granulations. Photograph B taken one month after Photograph A.

recover. This is what the prelisterian surgeons had observed, and it is still true. Pus is a complex fluid containing tissue debris, leukocytes and their enzymes, and bacteria and their toxins. Of these constituents, leukocytes and their enzymes are nature's agent for the destruction of bacteria, the digestion and removal of necrotic tissue and the general cleansing up of the wound. There is no irrigation of an infected wound which can approach in efficacy nature's own irrigation, which is pus. If an abdominal incision becomes in-

fected, all that is necessary is to remove one or two stitches so that the inflammatory exudate will not be kept under pressure. From this time on the wound can safely be let alone. The pus will digest and loosen the necrotic tissue and the wound will heal usually with surprising speed. Healing is thwarted by irrigations, packing or other forms of meddlesome treatment. We are now in a period characterized by radical conservatism in the treatment of infection.

Treatment of Granulating Wounds

The surgeon nowadays is often confronted with the problem of covering extensive areas with skin following burns and severe industrial injuries. These wounds often require sterilization and other preparation of extensive areas of unhealthy granulation tissue before skin grafting can be attempted. We have found that the sterilization of these areas can be accomplished by the use of ultra-violet light employed for a brief period of time for several days in succession.[11] This idea was suggested by the use of ultra-violet light to sterilize drinking water. If the granulations are very edematous and redundant, they should be compressed, either by means of a bandage or by covering them with rubber tissue over which flat rubber sponges are placed, the whole being strapped over the wound as its situation may demand. This method will usually make unnecessary the widespread excision of granulation tissue. Excision is not necessary unless the base of the granulation tissue is composed of very thick and poorly vascularized scar tissue. By treating granulating areas by the methods just described, they can be covered with skin in a comparatively short period of time. We are in the habit of using Thiersch grafts almost to the exclusion of all others. For areas where a comparatively thick layer of skin is required, we have found that Thiersch grafts of great thickness give a remarkably good cosmetic and functional result. In fact, it seems to us that they give a better result than the so-called full thickness or Wolfe grafts. The latter require the sacrifice of considerable skin and demand a very exacting technic and are unsuccessful in a considerable number of cases, whereas the extra heavy Thiersch grafts are practically always successful.

Tensile Strength of Scars, Especially Scars of the Abdominal Wall

Surgical literature is replete with articles on postoperative evisceration and on postoperative abdominal hernia. It is also replete with articles on the relative merits and indications for the use of catgut and silk. I have no intention of discussing either of these questions at length. Suffice it to say that all forms of suture ma-

terial are harmful to the tissues and at best a necessary evil; that the use of non-absorbable material is certainly contraindicated in the presence of infection or of considerable danger of infection; that the best and only effective method of preventing evisceration and hernia after laparotomy is by the use of abdominal incisions which give a high degree of protection against these dangers, even though the abdominal wound should be infected. The evils under discussion are most likely to occur following incisions in the upper part of the abdomen. It seems to me that they are for the most part due to the

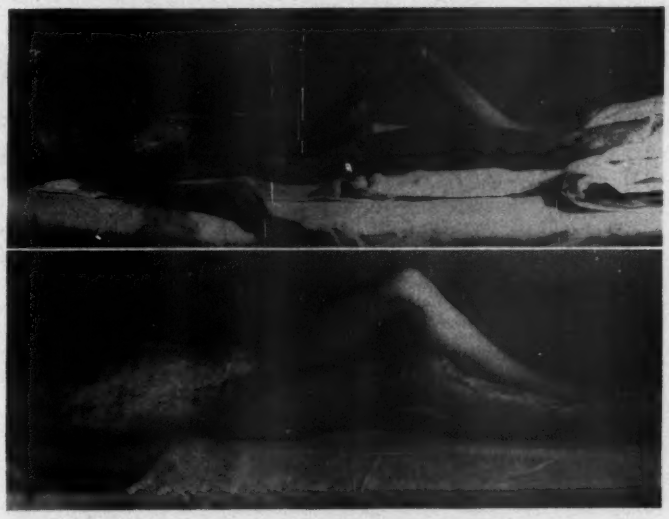


Fig. 4. Extensive skin defects following a burn. Photograph A, condition on admission. Photograph B, condition two months later.

division at right angles to their course of the fibers of the aponeurosis of the transversalis muscle. If this be done firm suture of the severed aponeurosis is almost impossible because the sutures pull out between the ends of the severed fibers. Practically all danger of evisceration and hernia can be prevented if the fibers of the aponeurosis are separated without being cut. If abdominal incisions, especially when there is danger that they become infected, be sutured loosely with interrupted stitches, care being taken not to close the skin tightly, it is amazing to observe how seldom they become seriously infected.

Two Experiences with the Use of Sulfanilamide for the Treatment of Infected Wounds

I recently observed an infection of a hernial wound which had been sutured with silk. Smears of the pus revealed streptococci.

The local and systemic reactions were severe. The patient was given 60 grains of sulfanilamide by mouth daily for two days, and after that 20 grains a day for a week. The temperature came down to normal in 48 hours and remained normal. The discharge from the wound rapidly lessened, although it continued in the form of serous drainage for about three weeks. At the end of that time six fine silk sutures were discharged and the wound closed without any evidence of sloughing of the fascia. The wound has been firm and there is no reason to believe that the success of the operation has been in danger.

A second patient, a very obese woman, developed a violent infection of an abdominal wound following the removal of a gangrenous appendix. Smears revealed the presence of a large number of streptococci. She was given sulfanilamide in the same dosage as the other patient. Her temperature promptly came down to normal and there was a striking improvement in her general condition.

On the basis of this limited experience, I take a rather hopeful view of the treatment with sulfanilamide of streptococcal infections of wounds.

It is to be hoped that a similar remedy will be discovered for staphylococcal infections. Even now the results obtained by treatment of these cases with the recently developed anti-staphylococcic serum is encouraging.

REFERENCES

1. Reeves, J. R.: Infections by Gas-forming Anaerobic Bacilli; Analysis, J. A. M. A. *104:* 526 (Feb. 16) 1935.
2. Reid, M. R.: The Study of Wound Healing, Ann. Surg. *105:* 982 (June) 1937.
3. Orr, H. W.: Principles Involved in Treatment of Osteomyelitis and Compound Fractures, Journal-Lancet *54:* 622 (Oct. 1) 1934.
4. Starling, E. H.: On the Absorption of Fluids From the Connective Tissue Spaces, J. Physiol. *19:* 312, 1895-6.
5. Starling, E. H.: "Principles of Human Physiology" Philadelphia: Lea & Febiger, ed. 6, 1933; Churchill.
6. Gatch, W. D.: The Effect of Laparotomy Upon the Circulation, Am. J. Obst. *70:* 55, 1914.
7. Drinker, C. K., and Field, M. E.: Lymph and Tissue Fluid. Lymphatics, Baltimore: Williams & Wilkins Co., 1933.
8. Menkin, Valy.: Studies on Inflammation; Factor in Mechanism of Invasiveness by Pyogenic Bacteria, J. Exper. Med. *57:* 977 (June) 1933.
9. Menkin, Valy.: Inflammation and Bacterial Invasiveness, Am. J. M. Sc. *190:* 583 (Nov.) 1935.
10. Du Mortier, J. J.: Resistance of Healing Wounds to Infection, Surg., Gynec. & Obst. *56:* 762 (Apr.) 1933.
11. Gatch, W. D., and Trusler, H. M.: Use of Ultra-violet Light in Preparation of Infected Granulation Tissue for Skin Grafting; Value of Very Thick Thiersch Grafts, Surg., Gynec. & Obst. *50:* 478 (Feb.) 1930.
12. Devenish, E. A., and Jessop, W. H. G.: Swelling of the Upper Limb Following Radical Mastectomy, Brit. J. Surg. *25:* 261 (Oct.) 1937.

SUDDEN OCCLUSION OF THE BRACHIAL ARTERY

Case Report

EDGAR BOLING, M. D.
Atlanta

A WHITE man, aged 34, was seen on Aug. 23, 1937, shortly after the sudden onset while walking of numbness and pallor of the right hand. There was no history of trauma. Physical examination revealed a cold, white, and slightly cyanotic hand with no radial or ulnar pulsation. The brachial artery could be felt pulsating above the cubital fossa. No paralysis of hand or fingers was present, nor were there areas of anesthesia.

The numbness was soon followed by intense pain for which morphine was given. The hand was placed in warm water. The systolic blood pressure in the left arm was 200 and diastolic 100; temperature 98 degrees and pulse 120 per minute. The morphine and heat had little effect upon the clinical picture, so the patient was referred to the hospital with a diagnosis of occlusion of the brachial artery at or near the bifurcation of the radial and ulnar arteries.

Upon admission to the hospital a retrograde thrombosis of the brachial artery could be felt extending about 3 inches above the elbow. Urinalysis was negative, white blood cells numbered 12,500, with 80 per cent polymorphonuclears; red blood cells 4,500,000, and 80 per cent hemoglobin estimation. The hand remained cold, blanched, and painful with no radial or ulnar pulsation. The pulse remained fast but no arrythmia was present. Heart sounds were normal, nor was there evidence on physical examination of cardiac enlargement. Blood pressure at this time was 190/100.

Embolectomy was considered but, due to the size of the artery at this point and the extension of the thrombus, it was not performed. The head of the bed was raised so that the right shoulder was 18 to 20 inches higher than the right hand, thus provoking venous congestion by gravity. At intervals of five minutes, his hand was raised for a few seconds to allow emptying of veins. Constant heat with electric pads was maintained about the right hand and lower forearm. The hand was allowed to soak in hot water ten minutes every three hours. Pantopon, grain ⅓ by hypodermic every four hours, controlled the pain and aminophylline was given by mouth for vasodilatation. A pavaex machine (negative pressure principle of Herrman and Reid) was not available without transferring the patient to another hospital so this was not used. No evidence of gangrene was detected during the first week, and the color of the hand and fingers changed to a pinkish cyanosis, with intervals of normal, healthy pink appearance. At this time pantopon, grain ⅙ by mouth,

could be substituted for the hypodermic to control pain so the patient was dismissed from the hospital but the same treatment was continued at home. At the end of the second week blisters appeared on the tips of his little and ring fingers. A brownish discoloration of the distal third of the distal phalanges of the little and index fingers followed with a brown spotting of the tips of the middle and index fingers. There was shrinking in size of the tissues so discolored, and the nail of the little finger became loose and was removed. The blistered areas ruptured, and weeping raw areas resulted. During the third week pain became more intense and continuous wet dressings of hypertonic salt solution were tried without relief. Nupercainal ointment locally, barbital by mouth, and morphine hypodermically were given with only temporary relief. On September 24 a two hour and twenty minute treatment in the pavaex machine was administered in an effort to control this intractable pain. Second and third treatments of two hours each were given on September 27 and 29, but the pain continued. As it was mainly localized in the terminal phalanges of the little and ring fingers, and as the distal ends of both phalanges were sloughing, amputation of these distal phalanges was advised and the patient returned to the hospital October 1 for operation.

During the night before scheduled amputation, the pain suddenly subsided and weak pulsations in the radial artery were felt for the first time. The pulsations were stronger at times but there were intervals when no pulsation could be felt. Amputation was deferred and after four days without pain the patient was returned home, and seven daily treatments of two hours each with the pavaex machine were taken. The localized areas of gangrene were allowed to separate spontaneously. The ring finger has healed satisfactorily but there is chronic osteomyelitis of the distal phalanx of little finger that has continued to drain and will need further treatment, probably amputation.

An electrocardiogram is normal and the blood pressure remains around 190/100.

Wassermann and Kahn tests are negative.

Comment

This case is presented to show the result following the conservative treatment of a sudden occlusion of the brachial artery without embolectomy. Immediate embolectomy is strongly advocated in all such cases by Key of Sweden, the pioneer of this operation in his country. He reviews 382 Swedish cases of which 86 had restored circulation following embolectomy. The axillary or brachial artery

was involved in 45 cases with restored circulation in 20. He states, however, that in obstruction to the circulation due to thrombosis after embolectomy it is the collateral circulation which saves the upper extremity more frequently than the lower. In the editor's comment in the Yearbook of Surgery, 1937, Graham asks the questions, "How often will gangrene follow if the embolus is not removed? Should one feel compelled to remove the embolus in all cases, especially if the lesion involves the axillary or brachial arteries?"

This case further emphasizes the value of venous congestion by gravity of the affected part. Constant elevation definitely diminishes the flow and volume of blood in an extremity, but this is usually

Fig. 1. End result.

recommended in texts dealing with this subject. The three important "don'ts" in treatment mentioned by McKechnie and Allen of the Mayo Clinic are: "Don't elevate the extremity; Don't subject it to heat which exceeds by more than a few degrees the normal temperature, and don't delay treatment." Conservative treatment includes the liberal administration of opiates and vasodilators. Papaverine seems to be the most effective.

To facilitate the establishing of the collateral circulation, the pavaex machine is recommended if available. It was used in this case, a month after onset, with the hope of controlling the intractable pain. One can but surmise whether the localized areas of gangrene would have resulted had the pavaex treatment been instituted from the beginning. In a recent number of the *Journal of the Ameri-*

can Medical Association, Collens and Wilensky report an experience with 124 cases of peripheal vascular disease treated by intermittent venous occlusion. They believe this procedure is capable of producing a more profound therapeutic effect than the method of alternate suction and pressure by the pavaex machine.

REFERENCES

1. Key, E.: Embolectomy on Vessels of Extremities, Brit. J. Surg. *24:* 350-361 (Oct.) 1936.

2. McKechnie, R. E., and Allen, E. V.: Sudden Occlusion of Arteries of Extremities; Study of 100 Cases of Embolism and Thrombosis, Surg. Gynec. & Obst. *63:* 231-240 (Aug.) 1936.

3. Collens, W. S., and Wilensky, N. D.: Intermittent Venous Occlusion in Treatment of Peripheral Vascular Disease; Experience with 124 Cases, J. A. M. A. *109:* 2125-2130 (Dec. 25) 1937.

BRAIN ABSCESS WITH GROSS RUPTURE INTO THE LATERAL VENTRICLE

JOSEPH E. J. KING, M. D.

New York

IT is well known that rupture of a brain abscess into the ventricle is one of the chief causes of death in cases of brain abscess. I am not acquainted with any recorded method with which one may deal adequately with the management of gross rupture of a brain abscess or its cavity, after evacuation, into the lateral ventricle.

In the past we have observed a few cases in which there was leakage of cerebrospinal fluid from the ventricle through the surface of a brain hernia. Inasmuch as the central portion of the presenting brain is the thinnest portion, the site of the leak is usually in the middle of the exposed brain surface. The reason for this is that the central portion of the brain area is the site formerly occupied by the floor of the abscess. Therefore, the interval of brain substance is thinnest at this point. With proper dakinization and protection of the elevated surface of the brain, these leakages from the ventricle, which last from five to eight days, caused us no worry or extra concern. Retrograde infection did not occur through these small leaking fistulae.

It was only when, in April, 1934, I was confronted with a case of gross rupture into the anterior horn of the lateral ventricle that I was at a loss to know how the condition could be managed. I had had no previous experience in such cases. The management of the case proved to be efficacious and the patient recovered. In 1936 a somewhat similar experience was had, but in this instance the abscess was in the temporal region. In 1937 a third case with gross rupture into the ventricle was encountered. The observations made and the management of these cases constitute the basis of this paper.

I shall first give the case reports in some detail and then describe what is believed to be a suitable and adequate form of management.

CASE REPORTS

CASE 1.—L. A., a white furrier, 32 years old, was admitted to the Medical Service of Bellevue Hospital on Mar. 23, 1934. #27-39 A.

Past History. At the age of 21 he had been struck over the right eye by a baseball, followed by slight trouble with vision of the right eye. No diplopia or diminution in acuity was noticed. He had frequent sore throats and colds; frequent "head colds" with obstructed nasal breathing and postnasal drip for the past five years. Diagnosed as frontal sinusitis, right. For the past year he

Presented before the Postgraduate Surgical Assembly, the ninth annual meeting, of The Southeastern Surgical Congress, Louisville, March 7, 8 and 9, 1938.

had had some "shading" of vision in the right eye. The patient smoked moderately and did not use alcohol.

Present Illness. He had been well until the latter part of January, when he first began to have headaches—dull pain over the right eye—which he thought was due to eyestrain. After three or four days the pain became sharper, constant, and was felt all across the forehead. One week later the pain seemed to be deeper, bitemporal, and persisted until his first admission to the hospital on Feb. 13, 1934. On the day of admission his associates stated that he had acted queerly all day. He suddenly lost consciousness in the store while at work and had a convulsion, followed by another in about twenty minutes. Neurologic note made on first admission showed paresis of the left face, arm and leg; abdominal reflexes absent on left and present on right; ankle clonus well sustained on left and not on right; patellar and Achilles reflexes more active on the left and equivocal left plantar response. These findings were transitory. The following day the general condition improved. X-ray films of the skull revealed a pan-sinusitis, more marked in the right maxillary and frontal sinuses. Pus was evacuated from the right ethmoid sinuses by the intranasal route. He was discharged on February 23 and stated that he felt well. Temperature, pulse and respiration were normal.

For about one week after his discharge he felt well. Then he had a severe bitemporal and deep-seated headache which lasted for one day. On the morning following the onset he became nauseated and vomited. Headache was aggravated by change in posture and straining. No other symptoms were referable to special senses, motor or sensory. There were no aphasic or uncinate phenomena. Three days before the second admission the patient had a recurrence of headache with nausea and vomiting which lasted three days. The headache was deep-seated and worse on the right side. He was unable to sleep well and appeared somewhat drowsy. He stated that the drowsiness was due to lack of sleep.

Physical Examination. He was a well developed and well nourished adult male, apparently suffering from pain in the head. He appeared somewhat drowsy but was rational and cooperative. The scalp was negative. There was some tenderness on pressure over the right frontal sinus, and pain was elicited over the right frontal region on percussion. The right ear drum appeared slightly granular but there was no discharge from the ear. There was postnasal discharge. The mouth and neck were negative. Remainder of physical examination was negative except for the neurologic findings.

Neurologic Examination. Right pupil slightly greater than left. Both reacted through a small arc to light, but better to accommodation. He failed to recognize any odors on right. There was a right sixth nerve paresis with diplopia in the right field of vision. The right fundus could not be seen due to an opacity of the media (traumatic cataract). The left fundus showed indistinct margins with 2 or 3 diopters of elevation, veins rather full, numerous small hemorrhages and exudate. Air conduction was greater than bone conduction on the right and left. Weber referred equally. Other cranial nerves normal. No paresis or atrophies except of the right sixth nerve. Sensory examination normal throughout. Normal speech. Coordination normal. The gait was slightly shuffling and slow, but no gross defect.

Reflexes. Upper left slightly greater than right. Hoffman negative on the right, suggestive on the left. Left abdominal slightly greater than the right. Cremasterics equal. Suprapatellar not elicited. Knee jerks were sluggish, and

on reenforcement the left was slightly greater than the right. Ankle jerks were present and equal. No abnormal reflexes elicited.

Lumbar puncture on March 23 showed 28 cells per cubic millimeter, 11 polymorphonuclears, 7 lymphocytes and 10 unclassified. Globulin 1 plus; sugar 0. Temperature was 98 and pulse 66.

Radiographic films were negative except for involvement of sinuses. He was transferred to the Neurological Service on March 26.

Dr. E. D. Friedman, who was on the service at the time, considered the condition to be a brain abscess in the right frontal lobe.

I was called to see the patient on the 29th. He was talking to his wife in normal manner, chatting about home affairs, his improvement, etc. He did not appear to be ill. One could hardly believe the history. He looked so well. Hypertonic glucose had been administered, his drowsiness had disappeared, and at the time one could not possibly make a diagnosis of brain abscess from the findings. One of the staff said: "But you should have seen him before the glucose solution was given." Therefore, it was ordered that the glucose should be withheld for 24 hours. This was done. On the following day the patient was stuporous, pulse 45-60. There was slight paresis of the left upper extremity, and the typical picture of a right frontal lobe abscess presented itself. Leukocytes 18,000; polymorphonuclears 90 per cent, temperature 98, pulse 60, respiration 18. Hypertonic glucose solution was given again intravenously, and the patient's mental condition cleared.

Operation for frontal lobe abscess, right. April 4.

Through a burr hole in the right frontal region made about 1 inch above the supraorbital ridge and about 1¼ inches to the right of the midline, the dura was nicked, and a brain cannula was inserted. At a depth of 1.5 cm. the typical resistance offered by the wall of a well-encapsulated abscess was met with. The abscess was not entered. The bony opening was enlarged to the size of a silver dollar; the dural opening was made slightly smaller, and the cortex was exposed. Its color and appearance were practically normal. The frontal sinus contained yellow pus and thickened membrane. There was no perforation of either plate and no extradural abscess. The cortex overlying the most anterior portion of the abscess wall was 1 cm. in thickness. After its removal by suction the presenting portion of the abscess wall came into view. It was brownish-red in color. When the wall, which was less than 3 mm. thick, was incised, thick yellow pus without odor was evacuated. A circular area of the wall about 1.5 cm. in diameter was removed so as to allow complete inspection of the abscess cavity after removal of the pus. The inner surface of the abscess was pinkish-red in color. There were no extensions or secondary pockets connected with the cavity. The abscess was about the shape and size of a small hen egg, extending backward into the frontal lobe for about 1½ inches. There was no leakage of fluid from the ventricle. A specimen of the pus was sent to the laboratory but no report was recorded.

The operation and dressing were carried out as described in previous papers. Avertin and local anesthesia were used.

Postoperative notes.

The rather copious notes showed that the patient made excellent progress. The iodoform gauze was removed as usual and the abscess cavity had become obliterated until it was only a small depression in the central portion of a slight herniation (fig. 1). This was the state of affairs when I left the city for

about 10 days. In this interval the hernia had increased in size and height until it protruded about 1½ inches above the level of the skull. This was due to the fact that intraventricular pressure had been allowed to increase too much. Lumbar punctures, which were not done, would have prevented this.

Fig. 1. L. A. (Case 1) Condition of wound April 10, 1934. Brain surface on level with scalp. Abscess cavity obliterated. The incision allows exposure of brain abscess and obliteration of frontal sinus. Scalp flap folded and fixed to prevent shrinking.

Fig. 2. L. A. (Case 1) May 2, 1934. Photograph shows wound after removal of detached portion of hernia uncovering the site of opening into ventricle.

After my return a lumbar puncture was done, and the hernia subsided somewhat. A compression dressing was applied in order to hasten regression of the hernia. A fault was created between the overlying fibrous dome of the hernia and the softer underlying brain substance. In this space fluid accumulated and this fluid became purulent.

On May 1, lumbar puncture was done: 35 c.c., clear; 8 cells, all lymphocytes. During the evening, the patient had chilly sensations, vomiting and the temperature, which had been just above normal since the time of his operation,

became elevated to 103. It was necessary to remove the overlying portion of the hernia in order to evacuate the pus and also because some of the dome had become necrotic from too much compression and infection. The pus was thin, contained broken-down brain substance and was of recent origin. There remained only a thin layer of brain substance over the anterior horn of the ventricle. On May 2 (fig. 2), after a small bridge of brain tissue was removed, it was observed that a leakage of cerebrospinal fluid was taking place through the floor of the small secondary cavity, near the middle anterior part of the brain surface. This leakage was from the anterior horn of the ventricle and was not subarachnoid. The opening was not large but sufficiently large to decompress the ventricle. A note made at the time stated: "A gauze dressing was applied encircling the hernia and at a sufficient height to prevent compression, with a rubber dam over the brain substance so as to allow Dakin's solution to come in contact with the area and prevent blocking of the flow of cerebrospinal fluid which otherwise would occur were the area covered with gauze. It is desired that nothing shall obstruct or lessen the leakage. If so, and if the area is not properly dakinized, retrograde infection of the ventricle will certainly follow. In other cases in which leakage from the ventricle through the hernia occurred, recovery followed without infection and the leakage, after several days, ceased spontaneously. So it is now imperative that dakinization should be well done. The outcome will probably be determined within the next three or four days." Leakage of cerebrospinal fluid continued. The patient's condition was fairly good for a time with recession of his temperature to 100. However, on May 23, his temperature became elevated to 104, pulse 140, he became comatose, incontinent of feces and urine, and had a very stiff neck and bilateral Kernig sign. Flow of cerebrospinal fluid from the ventricle ceased and there was some sloughing of the tract leading down into the anterior horn. Although dressings were done daily, the entire staff gave up hope for recovery.

It was observed after each dressing that the patient's condition was better for about two hours. It was believed that this improvement was due to the fact that there was an enormous escape of cerebrospinal fluid through the large opening into the ventricle, which opening had now become the size of one's finger tip. Each time the dressing was removed, there was a sudden gush of fluid from this opening, the fluid being somewhat murky in appearance. The dressing evidently pressed upon the area and prevented proper continuous drainage of the fluid. This dammed the infection back into the ventricle and made matters worse. It was believed that should *continuous* flow or escape of the fluid take place, there might be some chance of recovery.

Therefore, on May 23 all dressings were abandoned. The dressing was removed and left off. Continuous and increased flow of cerebrospinal fluid was desired, in the belief that infection in the ventricles and meninges would be lessened, repeated retrograde infection would not likely occur "upstream," and decompression would be effected.

All our efforts were concentrated on increasing the amount of fluid escaping from the ventricle. The foot of the bed was elevated so as to incline the bed about 25 degrees with the head downward; 6,000 to 9,000 c.c. of fluids were given daily, per rectum, intravenously, subcutaneously and through a Levin tube at times. A continuous drip-irrigation of Dakin's solution was directed on the brain surface, over the large ventricular leak, for the first two days and nights by his nurse. Feedings consisted of rectal feedings and intravenous glucose with insulin. Gastric feeding through a tube was not done on account of the marked depressed position of the head. The patient could not take food

by mouth on account of his comatose condition. His general condition improved rapidly during the next few days. On the evening of May 24 he was rational and could take food. His temperature receded. The output of urine was about 3,100 c.c. On May 26 the patient complained of burning on urination and the output of urine was only 400 c.c. in 24 hours, although he voided at frequent intervals. He developed cystitis and had a stormy course from the bladder infection from May 28 until June 13, with a spiking temperature ranging

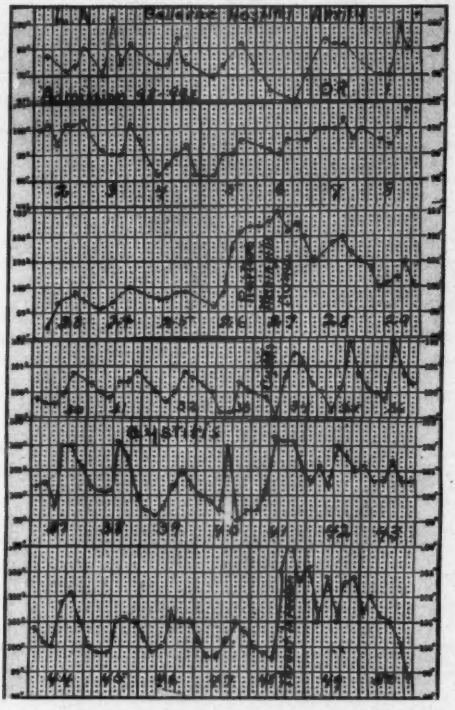


Fig. 3. L. A. (Case 1) Temperature chart, complete except for last three days.

daily from normal to 105 (fig. 3) and pulse between 90 and 160. During the periods of high fever, he was irritable and irrational at times. Had it not been for the bladder infection, the temperature resulting from the meningeal soiling might have subsided and remained normal after continuation for 3 or 4 days of the management above described.

Thereafter, the convalescence was uneventful. Consciousness returned four days after the management was instituted. His temperature gradually returned to 100 by June 13; the leakage of cerebrospinal fluid ceased on June 9. There was still considerable bulging of the hernia on the upper side and to a lesser degree on the lower side. After a lumbar puncture, there was some umbilication in the central portion which was directly over the anterior horn of the ventricle. Note on June 19: "Temperature has remained almost normal for a week, and his general condition is good. The brain surface is flat and on a level with the scalp, with the central portion slightly depressed. The area has

been covered with perforated strips of adhesive which have induced the epithelium to begin to spread across the brain surface from the scalp margin." The area became completely epithelialized. On June 23, at lumbar puncture, 18 c.c. of clear xanthochromic fluid were removed. Cell count not stated. On July 28, 1934, the patient was discharged healed to Burke's Foundation for two weeks rest.

Fig. 4. L. A. (Case 1) Photograph of patient on September 26, 1934, showing area healed three months after discharge from hospital. Scalp plastic deferred on account of danger of latent infection.

A photograph made on September 26 (fig. 4) showed the area well healed with the scalp flap folded back on itself and in good condition. The patient returned to his work and conducted his own business.

On May 21, 1935, the patient was re-admitted for scalp plastic which was done the next day. He was discharged on June 4, with the wound well healed and with but little disfigurement (figs. 5a and 5b). He has remained perfectly well since; is mentally bright and alert and has had no convulsions since operation for brain abscess.

COMMENT

Favorable. Benefits derived from the use of hypertonic glucose solution were more marked than in any case observed with regard to its decompressive effect. Brain abscess was readily located and operated upon together with drainage and *obliteration* of the frontal sinus. Management of the case after the cerebrospinal fistula was established was designed to increase the outflow of cerebrospinal fluid and continuous drip-irrigation with Dakin's solution was instituted. Recovery, scalp-plastic and return to business followed.

Unfavorable. Over-herniation of the brain abscess cavity was due to lack of lumbar punctures and improper dressings. Forceful

Fig. 5. (a) and (b) L. A. (Case 1) Photographs of patient November 12, 1935, about six months after plastic operation. Cosmetic results are better when the lower horizontal limb of the incision follows the upper border of the eyebrow line, or is below the eyebrow, and when the vertical portion is in the midline.

attempt to reduce the hernia cerebri resulted in sloughing of the dome of the hernia necessitating its removal. Gross rupture into the ventricle, necrosis of walls of fistula and retrograde ventricular infection developed. Cystitis followed catheterization.

CASE 2.—J. N., a schoolboy, aged 10, was admitted to Bellevue Hospital Jan. 22, 1936. No. 46242.

Chief complaints were pain and swelling in the left temporo-occipital region and foul smelling discharge from the left ear.

Present Illness. On the evening of Dec. 11, 1935, the patient left his home to post a letter, and twenty-five minutes later his mother learned that he had been found unconscious on the street (supposedly struck by an automobile) and had been taken to Lenox Hill Hospital. The mother visited him there and found that he was unconscious and was bleeding from the nose, mouth and left ear. The patient remained in a stuporous condition for four days, after which he improved slowly. His right side—including face, hand and leg—was "paralyzed." This condition slowly cleared up after a period of two weeks. At the time the patient regained consciousness his mother noted that he had difficulty in naming objects. He referred to his mother as "him." On Christmas day when he was given a toy dog he said: "I know what it is but I can't say it."

The left ear continued to discharge bloody fluid until January 5. The ear became dry for a few days. Thereafter discharge from the ear recurred, but it was foul-smelling yellow pus. It continued to the time of transfer to Bellevue Hospital. Swelling appeared in the left temporo-occipital region directly after the injury, continued to the time of admission, and became painful about one week before coming on the Service.

Physical Examination. Temperature 101.4, pulse 110, respiration 20. Examination of heart, lungs and abdomen was negative.

Neurologic Note: The patient presented very definite anomia, agraphia, and alexia. When asked to read the word "dog" he read it "tog" and said: "I got one; it runs on four legs, it's this—" indicating a toy dog on the bedside table.

Fundi showed swelling of the upper nasal quadrants of both discs and engorgement of the veins. There was slight right facial weakness. Deep reflexes were slightly more active on the right, with sustained ankle clonus on the right, but no Babinski. There was an area of swelling, redness and tenderness about 6 inches in diameter in the left temporo-occipital region. This area fluctuated, and on deep pressure one suspected involvement of the underlying bone. Red blood cells 3,500,000; white blood cells 18,500, with 92 per cent polymorphonuclears.

Ophthalmologic Examination. Pupils equal, both sluggish to light, especially the right. Both discs clearly outlined and pinkish. Veins full and tortuous, especially in the left fundus. Suggestion of nasal hemianopia left eye to gross examination. Visual fields showed general constriction.

Radiographic Examination. X-ray films revealed a comminuted depressed fracture of the left temporal region with rarefaction of the fragments. Large soft tissue induration over the comminution. The fracture line extended through the upper portion of the mastoid and the mastoid was diffusely cloudy, also the petrous. The right mastoid was normal.

On January 23 a small incision was made over the area of tenderness and fluctuating swelling and a large amount of pus was evacuated. On the following day temperature was normal. The patient was not drowsy. There was no headache, nausea or vomiting. No signs of meningismus or meningitis. There were still marked tenderness over the mastoid tip and mastoid, and profuse drainage from the wound and from the ear.

The patient was seen by Dr. Foster Kennedy, Dr. E. D. Friedman and myself. The diagnosis of left temporal abscess, secondary to the fracture of the skull involving the mastoid process was made. The patient was retained on the service for a few days in view of the fact that his general condition was so good, to allow the acute swelling to subside.

On January 28 the patient was examined by a member of the otologic service who reported that the "left external auditory canal was filled with thick, greenish yellow pus. Drum red—no landmarks. Some sagging of superior canal wall. Marked mastoid tip tenderness with some edema. Nose and throat negative. Right ear negative."

On account of his ear and mastoid condition the patient was transferred to the Otological Service with the expectation of operating upon the mastoid, the infected comminuted depressed fracture and the temporal abscess at the same time and in that order. The mastoidectomy was to be done by the otologist, and the remainder by me. I was operating in another hospital and could not be present at the time the mastoidectomy was performed. Therefore, the otologist carried out the entire procedure.

Operation. Jan. 29, 1936. Ethyl chloride and drop-ether anesthesia.

"Curved incision made from temporal region around the ear and down over the mastoid. Periosteum and temporal muscle reflected. Several pieces of skull fragments removed from temporo-parietal region. Profuse hemorrhage, appar-

ently venous, and coming out of the parietal edge of the bone, was controlled with iodoform gauze. A large abscess was seen draining through the dura in the posterior part of the wound. It was probed. It was found to lead centrally and slightly forward. About half an ounce of pus drained. Culture taken (showed gram positive bacilli and Streptococcus viridans) and two or three ounces of cerebrospinal fluid escaped. Large rubber rolled drain was inserted. The fracture was found to extend down into the mastoid and through the antrum and bridge. This piece was removed allowing no support for the dura. The tip and sinodural cells filled with pus were curetted out. Cells over sinus plate and tip were well developed and diseased. Upper line of fracture ran through zygomatic portion which was left after sequestrum was removed. Fracture extended down to, and looked as if it might involve also the facial ridge. This sequestrum was removed in one piece without any apparent twitching of the face. Loose closure with iodoform gauze packed into dural recess and about abscess drain."

The patient's condition was poor at the end of the operation and a transfusion of 400 c.c. of blood was given.

Postoperative notes.

January 29. Temperature became elevated to 105, pulse 120. Profuse serosanguinous drainage, necessitating change of bed linen. White blood cells 29,000 with 91 per cent polymorphonuclears.

January 30. Temperature 102-103 (fig. 6). Fairly bright in the morning, but irrational in the afternoon and evening. Sphincters intact. Dressing very wet from drainage.

January 31. Forceful vomiting during the day and night. Patient dehydrated. Lips dry. Neck stiff; painful when moved. Drowsy. 800 c.c. of 5 per cent glucose and 25 c.c. of 50 per cent glucose given intravenously. All packing removed, also drain from abscess in temporal lobe. Moderate amount of cerebrospinal fluid followed removal of drain. Dressing kept wet with Dakin solution. Temperature 102-103. Profuse bloody serous discharge from dressing. Moderate herniation of dura and cerebrum.

February 1. Neck stiff. Bilateral Kernig. Temperature 103.8, pulse 120. Stuporous; nauseated. Sleeps most of the time. Total fluid intake 1,910 c.c. in 24 hours.

February 2. No drainage of cerebrospinal fluid. Hernia slightly larger. Still somewhat irrational but thought improved. Highest temperature 101-8—lowest 100.

February 6. "Temperature rose suddenly at 3 p. m. to 102 and later to 104.2. Pulse irregular and rapid—140. Complained of headache about 11 a. m. and became very restless and irritable. Now drowsy and is aroused with some difficulty. Not as alert and responsive, but has been somewhat this way for the past three days. Wound dressed. Cerebrospinal fluid was escaping through iodoform dressing over hernia. Rupture seems to be at peak (tip) of hernia. Pulsations more noticeable. Neurological consultation requested."

I was requested to see the patient, and made the following note at 6:30 p. m.: "I have looked at the notes made by Dr. T., the temperature sheet, the nurses' notes and the patient. It is a typical picture of cerebrospinal fluid leakage through an abscess cavity. The patient's general condition, marked rigidity of the neck, elevation of temperature and pulse indicate meningeal soiling.

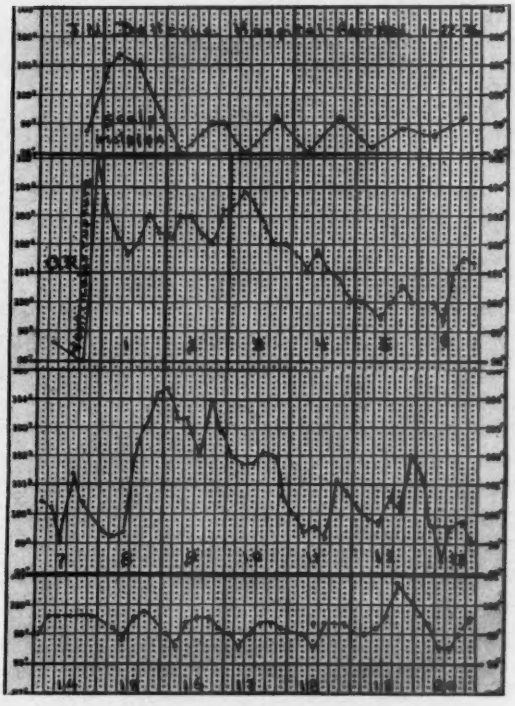


Fig. 6. J. N. (Case 2) Temperature chart showing three peaks due to scalp infection, operation, and rupture into ventricle.

Before looking at the wound it was believed that the proper management would be:

1. To remove the dressing and leave it off so that leakage from the ventricle will *not* be impeded, but will be facilitated.

2. *Constant* dripping of Dakin or azochloramid solution on the dome of the hernia at the site of the leak to combat infection.

3. Continuous intravenous instillation of saline solution to increase the output of cerebrospinal fluid.

4. Elevation of the *foot* of the bed for the same reason, and to prevent the irrigating fluid from running down beneath the patient's back.

5. Force fluids by mouth.

When the major portion of the dressing was removed—all but the last strip of iodoform gauze directly over the cerebrospinal fistula in the dome of the hernia—one could see fluid oozing through this last piece of gauze. When it was removed there was seen in the most prominent part of the dome of the hernia a slit-like opening about 1 cm. long, from which poured cerebrospinal fluid, rather clear and not turbid so far as could be determined. There was a circular hiatus, about ¾ inch, in the dura as a result of the trauma from bone

fragments and subsequent infection and through this hiatus the rounded end of the abscess wall protruded for a distance of about ⅝ inch. The dura and arachnoid were intimately adherent to the 'capsule' of the abscess. Leakage of cerebrospinal fluid did not occur from the subarachnoidal space, but directly through the slit-like opening in the protruding abscess wall or 'capsule.' A large amount of fluid escaped with movements and outcries, the latter meningeal in character.

The left side of the head was covered with vaseline gauze, ear included, to prevent irritation of the scalp, and a continuous drip, at first of Dakin's solution and later azochloramid solution, was carried out. The flow of cerebro-

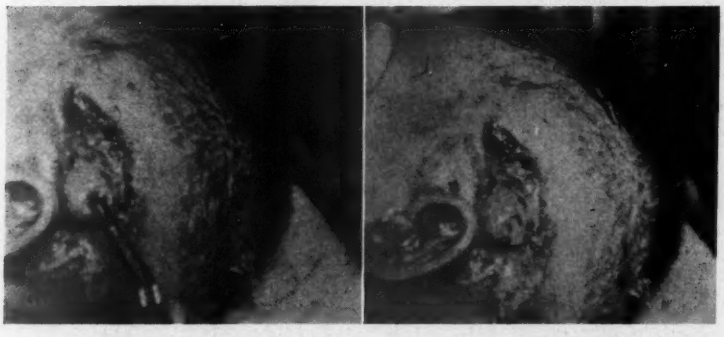


Fig. 7 (a) J. N. (Case 2) Photograph Feb. 12, 1934, showing the granulating area with the dome-like presenting portion of the wall of the brain abscess with bayonet forceps inserted into the slit-like opening of the fistulous tract. (b) J. N. (Case 2) Photograph of same area after a considerable amount of fluid was permitted to escape. The dome-like area is less tense and more flattened.

spinal fluid which after a few minutes became less, was augmented by slight gentle gaping of the slit-like fistulous opening in the hernia several times with bayonet forceps (fig. 7a). With the edges of the opening held apart one could readily see the walls of the abscess cavity. The protruding dome of the abscess wall was less tense and became more flattened.

Thus, the picture at that time was of a cerebral hernia of the temporal region, about the size and shape of the small end of a hen egg, somewhat conical in shape, measuring about 1 inch in diameter at the base, protruding above the dural surface about ⅝ inch in the middle of an angular granulating area, not in apposition to bone edges, with a slit-like cerebrospinal fistulous opening in its most prominent portion. This slit-like opening is the external opening into a collapsed temporal abscess cavity into which cavity traumatic rupture of the ventricle occurred at the time of operation by introduction of a probe. The collapsed abscess cavity, therefore, served as an 'aqueduct' for cerebrospinal fluid from the left lateral ventricle through the slit-like opening in the presenting portion of the abscess wall to the exterior.

The treatment outlined above was advised with irrigation of the hernia at drip-rate to be supervised by a special nurse.

"The hernia will not increase in size if the cerebrospinal fistulous opening in the abscess wall is kept patent. In fact, it became smaller and the surface became somewhat wrinkled and shriveled in the one hour during which it was observed (fig. 7b). The patient's general condition was much improved.

Called for the urinal, water, etc. Vigorous catharsis is advised against. Colon irrigation daily is preferred to enemas and cathartics.

"If the forced intake of fluid and free outflow of cerebrospinal fluid are continued, without a dressing being applied, the patient may recover like L. A., whose clinical record one should see." These suggestions were carried out.

February 11. Temperature returned to normal. The child took food well and was cooperative, mentally alert, and was no longer incontinent.

On February 24, the patient was returned to our service and on February 25 the following note was made:

"Since the evening of February 6 a continuous drip of azochloramid solution has been going, centering on the opening of the fistula in the dome of the capsule

Fig. 8. (a) J. N. (Case 2) Photograph made June 4, 1936, shows the well healed scar on day of scalp plastic. (b) J. N. (Case 2) Recent photograph.

of the brain abscess without any dressing applied. The solution has irritated his scalp considerably, especially about the wound and in the occipital region. I have seen him a number of times on Ward G 4, shaved the scalp about the edges of the wound a number of times, and gaped the opening in the dome of the 'capsule' several times to augment the escape of cerebrospinal fluid. It was observed that the slit-like opening tended to seal over and close so that very little leakage occurred except when it was gaped and for a short time thereafter. At times this fluid was yellowish, xanthochromic in appearance, and at times colorless. At no time has it been cloudy or turbid. The patient's general condition has been good for days, temperature running between normal and 100 since February 11, a period of two weeks. At the present time, there is no leakage from the ventricle. The leakage site has closed with no untoward effects.

"The wound area which has been irrigated constantly with drip-irrigation of azochloramid solution, is brownish-yellow in color and does not present the red granulating surface seen in instances where Dakin solution has been used. The scalp and skin of shoulders and neck were also markedly irritated although well vaselined. As has been previously observed, azochloramid solution does not dissolve the superficial sloughs as well as Dakin solution.

"The question arose whether the cerebrospinal fluid leakage should be reestablished. In view of the good mental and general condition of the child after the leakage had ceased, it was decided to leave the fistula closed. The drainage tract to the abscess cavity has been kept open so long with forced fluid intake

that any infection which was present has probably disappeared from the abscess wall. Therefore, the continuous drip-irrigation was discontinued and the usual Dakin dressing was applied with the lower jaw included and held with bandages and strips of adhesive to prevent displacement of the dressing."

After February 11, when the temperature returned to normal, the patient made an uneventful recovery and was discharged on March 28. The area was practically covered over with epithelium. The only residuals were partial anomia, agraphia, alexia, and hemianopia, which had previously existed.

After a rest at home the patient returned to school and got along well with his studies except spelling. On June 4, 1936, a scalp plastic was performed in Lawrence Hospital, Bronxville, N. Y., and the healed, non-hairbearing scar (fig. 8a) was removed, and the scalp edges accurately approximated. He was discharged on June 17, 1936, in good condition, returned to school, and has remained well (fig. 8b).

Comments

Favorable. Recognition of condition and institution of proper management. Refusal to remove abscess capsule. Recovery of patient, scalp plastic, and return to school work.

Unfavorable. Traumatic rupture of ventricle through abscess cavity by probe at time of operation followed by infection of the brain. The use of azochloramid solution instead of Dakin solution.

Case 3.—E. A., a coastguardsman, aged 23, was admitted to the Polyclinic Hospital June 9, 1937. #3739.

Present Illness. The patient developed left-sided otitis media in March, 1936. Myringotomy was done in a hospital. Discharge from the ear continued after he left the hospital, but he was free from pain until a week before admission. Complained of very severe pain in the left frontotemporal region, relieved to some extent by vomiting. He also complained of impaired hearing and buzzing in the left ear.

Physical Examination. He did not appear acutely ill. The head negative except for slight tenderness over left frontotemporal region, more marked on percussion. There was yellow purulent discharge from the left ear, foul odor. Pulse 80, temperature 99.5 and blood pressure 104/84. White blood cells 30,000, polymorphonuclears 86 per cent. Wassermann and Kahn tests negative.

Otologic Examination. Right ear normal. Left ear showed a large chronic perforation of the drum with edema and a small area of granulations on the anterior edge. Thick foul pus *pulsates* through the perforation. No acute process in nose or throat.

Neurosurgical note. "There is no emergency at the present time. An intracranial abscess may be present, but it cannot be diagnosed readily. It is believed that the left chronic otitis media and mastoiditis should be considered previous to any intracranial procedure. Mastoidectomy advised with probability of extradural abscess."

June 11, 1937. *Neurologic Examination*: Dr. Herman Wortis.

"Pupils fair-sized, round, equal, and react sluggishly to light and accommodation. External ocular movements normal. No nystagmus. Veins of left

fundus fuller than in right. No hemorrhages. No choking of the discs. There is a definite right lower facial weakness. Impaired hearing in left ear with foul discharge from the ear. Cranial nerves otherwise negative. No motor weakness other than right lower face. Both grips and lower extremities strong. Coordination good.

"*Reflexes.* All deep reflexes were present, equal and active. The abdominals and cremasterics were brisk. No response to plantar stimulation on right or left, neither flexor nor extensor. Pin prick felt equally on right and left."

The patient had marked left-sided headache, was stuporous, and very irritable. He made no definite mistakes in speech, but tended to perseverate. Cerebellar signs previously noted not present, though neck was held rigid. Temperature 100, pulse 68, respiration 21.

"*Impression.* Left mastoiditis with left-sided brain abscess, temporal or cerebellar. The mastoid should be cleaned out first and with it any extradural pathology which may be found. Ventriculograms may be necessary later to determine location of abscess."

June 12. *Neurosurgical note.* "The patient's condition has changed markedly since two days ago. X-ray films show a chronic sclerotic mastoid on the left side while the right is normal. Foul smelling discharge continues from left ear. The patient is decidedly stuporous, difficult to arouse, and his pulse is much slower—64. Temperature, which was normal, is now 101. Active abdominals. Bilateral absence of knee and ankle jerks. Great toe response neutral on left, slightly flexor on right. Very faint weakness of right upper and lower lips. Ventriculograms should be considered strongly, and if abscess is located, operations for mastoiditis and brain abscess should follow."

I was influenced in favor of the mastoidectomy without making ventriculograms on the suggestion that the chief trouble was an extradural abscess with associated subdural edema.

June 12. *Mastoidectomy.* Local anesthesia. Dr. Morrison.

The mastoid was sclerotic and was entered without the mallet and gouge. No mastoid cells. Antrum of usual size and contained granulations and a few drops of pus. Abbreviated radical procedure. When dural plate was exposed, three or four drachms of foul pus drained from an extradural abscess. Very wide removal of dural plate, backward to lateral sinus, forward to the level of the anterior root of zygoma, internal to labyrinth and upward into temporal bone for a distance of 5 cm. The dura was covered with thick granulations, the area measuring 4 cm. in the horizontal direction and 3 cm. in the vertical direction. Wound left wide open and packed with iodoform gauze. No sutures. No plastic on canal.

June 15. *Neurologic note.* Dr. Herman Wortis.

"At present drowsy, irritable and difficult to contact. The fundi definitely show more engorgement than at previous examination, and the physiologic pits are gone. The right lower facial weakness is as marked. Right extensor response is much more constant, while the left is equivocal at times and flexor at other times. Both abdominals absent. Knee jerks absent. Achilles jerks greater on right. He called a pencil a 'writer' and then perseverated and called the three next objects shown to him 'writers.' Although a definite aphasic status cannot be done accurately, these errors are suggestive of abscess in temporal lobe. Suggest ventriculography."

Cerebrospinal fluid cell count 240.

By this time the diagnosis of left temporal lobe abscess seemed logical to both Dr. Wingebach and myself. On account of the rather high cell count, and the white blood count of 30,000, deferring the operation would have been preferred. However, the critical condition of the patient made our decision in favor of operation.

June 15. *Operation for temporal lobe abscess, left.* Avertin and chloroform anesthesia. (Local anesthesia could not be used on account of the scalp infection.)

A well encapsulated abscess was located in the temporal lobe through a burr hole with a brain cannula at a depth of 1.5 cm. below the dura. The overlying and surrounding brain substance was very edematous due, it was thought, to trauma by compression at time of mastoid operation and the edema associated with extradural abscess. The abscess wall was brownish-red in color, friable, edematous, and about 2 mm. thick. When the abscess was incised, supernatant thin watery fluid first escaped, followed by thicker, yellow and very foul-smelling pus. ("Aerobic culture negative for 72 hours. Anaerobic culture not made, and smear was not made by intern.")

The abscess cavity collapsed rapidly. Lumbar puncture was done, 45 c.c. of cerebrospinal fluid being removed. The cavity opened up sufficiently to allow iodoform gauze to be inserted in the usual manner. There was no sagging of the cortex from the dura. Usual dressing.

Postoperative Notes. Temperature was 101.5 on the following day and gradually receded to normal on the fifth postoperative day, at which time the pulse was 70. Nevertheless, the patient was very irritable and would not cooperate. He cursed, hit the nurses and doctors with his fists, tossed his head about without restraint while the dressing was being changed, and objected to the instillation of azochloramid solution. (Dakin solution was not available.) He urinated in bed by choice, and was difficult to manage in every respect. The dressings were changed as usual, and the condition of the wound and patient, except for his obstinacy, was excellent. Lumbar puncture on June 19 showed clear fluid, cell count 80 per cubic millimeter, polymorphonuclears 20 per cent, lymphocytes 80 per cent.

June 25. "Dressed. All of the original iodoform gauze 'handkerchief' was removed slowly, hydrogen peroxide being used to loosen it. It was removed with great care so that the walls of the abscess cavity would not be damaged. The walls appeared healthy and covered with red granulations. The cavity was somewhat conical in shape, larger at the top and tapering to the floor in a somewhat triangular manner. The depth was 1⅜ inches. The brain surface was healthy. There were no sloughs and no herniation. On the contrary, the floor was not coming toward the surface as rapidly as usual, due to the diminished intraventricular pressure. The diminution of this pressure was accounted for by the fact that a lumbar puncture had been recently performed, daily saline laxatives and enemas were given, and the head was kept elevated in bed. The fluid intake was probably not as much as it should have been. In other words, dehydration of the brain had been carried too far. Head to be lowered, saline and enema discontinued for a day or so with greater intake of fluid. Another smaller 'handkerchief' was placed in the cavity and narrow iodoform gauze strips inserted therein. The bone edges had become covered with granulations and were not visible. The mastoid wound was healthy and covered with red granulations instead of the dirty, dusky granulations first observed. General condition good. Speech improved, but anomia still marked. Temperature, pulse and respiration normal."

His condition on the following day was also excellent, and he ate a big dinner: baked potato, fried chicken, vegetables, bread and butter, milk and ice cream. His behavior, however, was most irresponsible. He would lean out of bed and pick things up from the floor, toss his head about, got out of bed, and could not be managed. He would do just as he pleased.

June 27. When the dressing was removed at noon the entire brain area was sunken and markedly depressed. There was an opening in the middle of the floor of the abscess and cerebrospinal fluid spurted out when the patient tossed his head about, and ceased to flow when his head was still. He had vomited at 9 in the morning after a saline laxative had been given. His temperature and pulse, which had been normal, became elevated to 103 and 120, respectively. After observing the gross rupture into the ventricle, it was decided to employ the same management as was carried out in Cases 1 and 2. This was attempted, but the patient could not be kept quiet. He tossed, strained and squirmed. Hypnotics and sedatives would not quiet him except morphine in large doses. He still threw himself about after the administration of morphine in gr. 1/6 doses hypodermatically. Each time he strained or tossed a gush of cerebrospinal fluid spurted out of the opening into the ventricle. When he was quiet, fluid would be sucked back, or would run back into the partially filled ventricle. Therefore, the infection could not possibly be combated. Retention of urine necessitated catheterization. Cystitis ensued. Meningitis, and finally hypostatic pneumonia developed. He died on July 27, the forty-second postoperative day. It was believed that the causes of death were meningitis and terminal pneumonia. Temperature 106, pulse 140, and respiration 50. Permission for autopsy was not granted.

Comments

Favorable. Mastoidectomy with drainage of a large extradural abscess. Successful localization and drainage of a large temporal abscess.

Unfavorable. Failure to make ventriculograms or exploratory puncture for the purpose of localization of the abscess before mastoidectomy was done. Had this been done both procedures could have been carried out under *local* anesthesia at the same time, the mastoidectomy first, followed by operation for brain abscess. Overdehydration. Inability to control patient's irresponsible condition, and his utter lack of cooperation. Rupture of abscess cavity into ventricle. Lack of Dakin solution.

Suggestions for Management

In a case of gross rupture of a brain abscess or its cavity into the lateral ventricle, the following suggestions are offered:

1. Elevation of the foot of the bed so that the patient's head is low, with inclination of the bed about 25 degrees. This position will enhance the outflow of cerebrospinal fluid through the opening into the ventricle, carry infection out of the ventricle, and mitigate retrograde infection.

2. Forcing of fluids to increase the amount of cerebrospinal fluid output for the same purpose. Fluids should be given by mouth, if possible, Levin tube through nose into stomach, intravenously, subcutaneously, and per rectum. The intake should range between 3,000 and 9,000 c.c. in twenty-four hours, depending upon the age and size of the patient.

3. Removal of all dressings which might obstruct or tend to obstruct leakage from the ventricle. Abandonment of any type of drainage material in the fistulous tract leading into the ventricle. Drains are unnecessary, as a foreign body would tend to invite further infection.

4. Continuous drip-irrigation of Dakin solution on the wound to combat infection. The solution will destroy the usual bacteria present, will dissolve sloughs from the brain surface and scalp margins, and will not damage the brain. A wire apparatus rigged up over the head will maintain the tip of the irrigating tube in the proper position so that the nurse will not have to stand and hold it. It can be bent into any position desired. The end of the tip should be about 3 to 4 inches above the wound and not higher, otherwise the force of the falling fluid might damage the brain substance, and the solution might splash into the patient's eyes.

5. The use of an improvised Kelly pad beneath the head to conduct the excess fluid into a pail. This can be fashioned readily from rubber sheeting.

6. Protection of the scalp and skin of the ears, neck and shoulders, *from the beginning of the irrigation,* to prevent irritation and excoriation by Dakin solution. Vaseline may be used, but the best mixture probably is that of zinc oxide and olive oil in the proper proportion so that the ointment sticks to the scalp and skin. Should these structures become excoriated, they are painful and the patient will be restless and move about, strain, and cry out. All of these things prevent an even, smooth, continuous flow of cerebrospinal fluid from the ventricle, and invite "sucking back" and reinfection of the ventricle. Vaseline gauze, changed daily, should be placed in the external auditory canal to prevent irritation of the canal and drum. Fluid of any kind in the ear is annoying to the patient, and makes children especially fretful.

7. Shaving the area about the wound for a distance of 2 or 3 inches. This prevents collection of secretions about the wound and soiling of the area. This should be done every two or three days. If a sharp razor is used, soap will not be necessary as the hair is softened already by the solution.

8. Colonic irrigation, daily if necessary, rather than cathartics or enemas. Straining at stool produces sudden emptying of the ventricle and should be avoided.

9. Coughing and sneezing should be guarded against for the same reason.

10. Should catheterization be required on account of retention, Munro's tidal drainage should be instituted early to prevent cystitis. With the patient in the required position, cystitis is likely to develop if ordinary catheterization is done.

11. Nursing. One of the most essential necessities is a competent, intelligent, and diligent nurse to supervise the handling of these patients if a successful outcome is to be anticipated. This point cannot be over-emphasized.

12. Sedation. It is desired that the patient should remain quietly in the selected position, and various sedatives may be required. Sodium luminal given hypodermically probably will suffice.

13. The fistulous tract leading from the ventricle should be allowed to close of its own accord. It may be necessary to keep it open, but no attempt should be made to have it close suddenly. As it becomes smaller, very little escape of cerebrospinal fluid occurs, and the patient's general condition—temperature, pulse, mental condition, etc.—is good, the fluid intake should be gradually lessened. When the leakage ceases and the tract remains closed, and the patient's general condition continues good, the usual dressings are applied. These dressings should be well fixed to prevent slipping and causing damage of the brain surface. Dakinization should be continued.

After having had these experiences, I have thought about cases in which a cerebral abscess spontaneously ruptured into the ventricle *without* operation. Should the location of the abscess be known—temporal, frontal or parietal—it might be possible that the abscess could be exposed quickly, opened fairly widely, and the above suggestions carried out. I have not done this, but anticipate doing so should an abscess scheduled for operation suddenly rupture before the usual operation can be done.

Summary

1. Cases in which gross rupture of a brain abscess or its cavity into the lateral ventricle has occurred after operation hitherto have resulted fatally so far as is known to the author. A method of management of such cases that proved successful is recorded.

2. Reports of three cases in some detail have been made, with favorable and unfavorable comments on each case. Two patients recovered, and one died.

3. Suggestions have been offered for the management of similar cases.

4. The possibility of the use of this method in the instance of spontaneous rupture of an unoperated brain abscess into the ventricle is offered.

140 East 54th Street

REFERENCES

1. Hooper, cited by Korner. O. Die otitischen Erkrankungen des Hirns, etc., Wiesb. 1902, p. 79.
2. Zaufal, E.: Sinus Thrombose. Prog. med. Wchnschr., 1880, v. 516.
3. Lane, W. A.: Five Cases of Complicated Diseases of the Middle Ear, Tr.
4. Cody, C. C.: Lateral Sinus Thrombosis. Read before the Southern Section Am. Laryng., Rhin. & Otol. Soc., in Atlanta, Jan. 24, 1938.
5. Tobey, G. L., Jr.: Attempt at Differential Diagnosis of Lateral Sinus Infection, Boston M. & S. J. *194:* 53 (Jan. 14) 1926.
6. Ersner, M. S., and Myers, D.: Aid to Interpretation of Intracranial Complications Resulting from Venous Circulatory Disturbance of the Temporal Bone, offered by X-ray of the Lateral Sinus and Jugular Foramen, Laryngoscope *45:* 800 (Oct.) 1933.
7. Woodhall, B., and Seeds, A. E.: Cranial Venus Sinuses; Correlation Between Skull Markings and Roentgenograms of Occipital Bone, Arch. Surg. *33:* 867 (Nov.) 1936.
9. Kopetsky, S. J.: Otologic Surgery. New York: Paul E. Hoeber, Inc., 1925.
10. Kolmer, J. A.: Etiology, Prophylaxis and Treatment of Surgical Septicemia; Discussion of Principles Involved, Arch. Otolaryng. *26:* 59 (July) 1937.
11. Goldman, J. L., and Herschberger, C.: Prophylactic Vaccination against Intracranial Complications Following Pneumococcus Type III Mastoiditis, J. A. M. A. *109:* 1254 (Oct. 16) 1937.

OPERATING ROOM DIAGNOSIS OF UTERINE BLEEDING

ARTHUR E. HERTZLER, M. D.
Halstead, Kansas

ONE of the commonest problems which confront the surgeon is uterine bleeding. The causes are many and while the case history may suggest probabilities, diagnosis must be made at the time of operation. Each case must be solved tissue in hand. The pathologist can render but little aid because unless the surgeon can identify the offending area he will fail to secure tissue that will show the lesion on the slide. If he can identify the diseased area he has no need of a pathologist. Here, then, more than anywhere else, the surgeon must be a surgical pathologist. Fortunately the lesions are few and easily distinguished by touch and look. In fact the chief problem is to recognize or exclude epithelial malignancy.

Bleeding due to endocrine disturbances may be ignored here because the diagnosis can be made from the history. These are found almost exclusively in adolescent girls who are not subject to malignancies, and but rarely to other types of tumors. Therefore they do not come to the operating room for solution. If they do one will find nothing.

The lesions the surgeon will encounter when he confronts the patient in the operating room may be classified as follows:

CERVIX
- Erosion of the cervix
- Papillary growths of the cervix
- Ulcers of the cervix
- Carcinoma of the cervix

CERVICAL CANAL
- Polyps of the cervical canal
- Carcinoma of the cervical canal

BODY OF UTERUS
- Hyperplasia of endometrium
- Adenomyoma of the uterus
- Carcinoma of body of uterus
- Rare lesions of the uterus

Thus simplified the array is not formidable. A systematic examination of each region in turn will lead to solution in all but an occasional case in the lifetime of the surgeon. It is mandatory that a definite diagnosis be arrived at before treatment is begun. This is particularly to be emphasized now since many of the lesions in this region are subject to irradiation.

Presented before the Postgraduate Surgical Assembly, the ninth annual meeting, of The Southeastern Surgical Congress, Louisville, March 7, 8 and 9, 1938.

Lesions of the External Os

Erosions of the cervix. These seldom cause bleeding but they must be considered here because only on the proper interpretation of erosions are we able to exclude malignant conditions.

Erosions of course are not erosions. They are areas in which the columnar epithelium is exposed to view, due usually to lacerations. One must not forget, however, that prolonged discharges may destroy the squamous epithelium and when this is replaced by the columnar epithelium of the cervical canal a picture very like that which follows lacerations may be produced.

Therefore since the lesions are caused by protrusion of columnar epithelium they are a deep red and as such are sharply demarcated from the squamous epithelium of the cervix. The line of demarcation is sharp, let it be repeated. If there has been a laceration the eversion of the lips of the cervix at once makes this obvious (fig. 1).

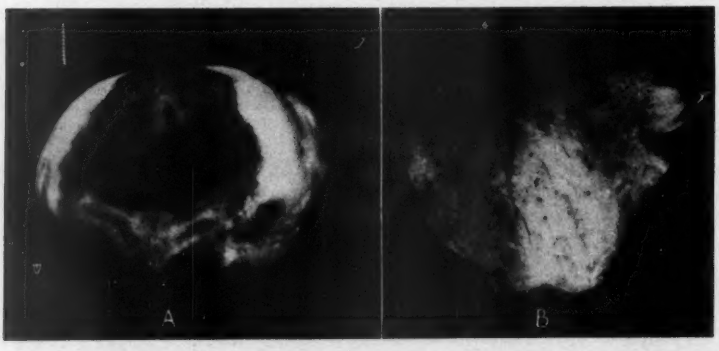


Fig. 1. Erosion of the cervix: A. The line of demarcation between the columnar epithelium and the squamous is sharply defined. B. Cross section. The most everted lip, *b*, shows the line of demarcation at *x*.

Furthermore the lesion usually involves the entire circumference of the cervix. But rarely only a segment of the circle may be affected. The red area may seem granulomatous and elevated and imitate malignancy on inspection but it is soft to the touch and does not bleed (fig. 2, A). In some cases the dividing line between the red columnar epithelium and the pink squamous may not be sharp. This is so because the cervical glands extend upward beneath the squamous epithelium partly destroying it (fig. 2, B).

Frequently within the red area or even in the pink area one can feel imbedded retention cysts. That they are such (if one doubts his palpatory findings) he may prove by puncturing them. The escape of a thick gelatinous material removes all doubt.

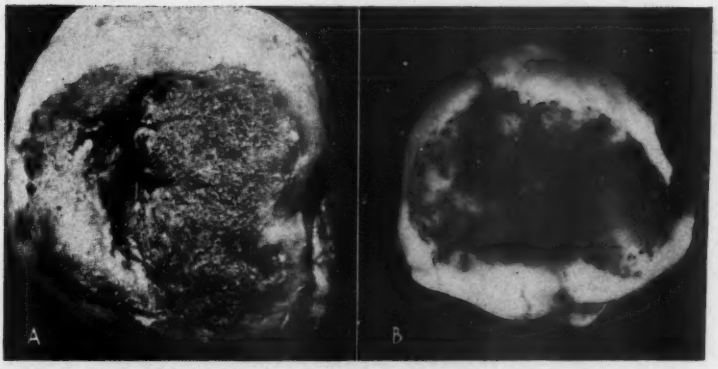


Fig. 2. Erosion of the cervix: A. Granular erosion sharply defined. B. Mottling due to extension of glands beneath the squamous epithelium.

Papillary Growths. Erosions due to irritation may produce a low papillary area produced by proliferation of the columnar epithelium with but little destruction of the squamous area. On inspection such areas may suggest malignancy but they are soft to the touch (fig. 3, A). Any of the types above mentioned may be complicated by the

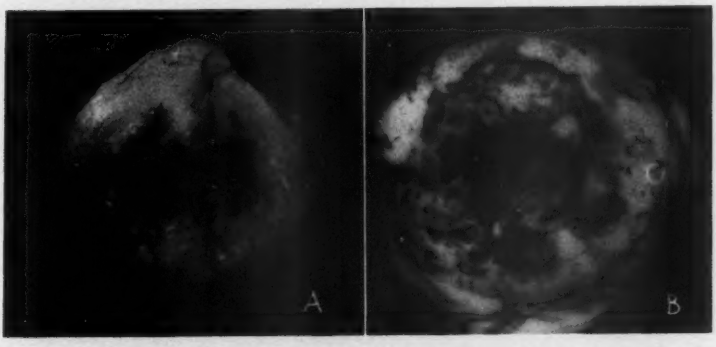


Fig. 3. Erosion of the cervix. A. Papillary erosion in a nonparous woman aged 30. B. Irregular nodulations of the cervix due to glandular proliferation beneath the squamous epithelium.

formation of elevated, even papillary areas (fig. 3, B). These lesions are worthy of especial mention because if excised and sent to the laboratory the pathologist in his uncertainty may diagnose carcinoma. Such lesions when subjected to irradiation naturally are permanently cured. This leads to confusion of statistics and to obfuscation of the operating surgeon.

Ulcers of the Cervix. True ulcers, that is areas denuded of all epithelium, are less common than the so-called erosions. That there

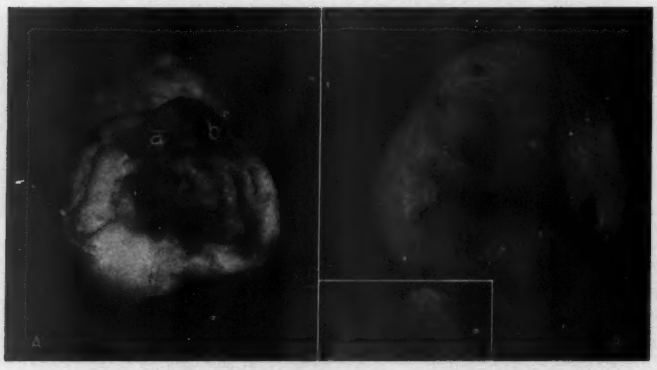


Fig. 4. Ulcers of the cervix: A. *a, b,* ulcers with granulating base. B. Sharply defined ulcer; *insert,* same on cross-section.

is a defect of the epithelium is usually apparent at a glance (fig. 4, A). This is particularly true on cervices of old prolapsed uteri (fig. 4, B). Sometimes granulomas spring up on these ulcers. On inspection these may suggest malignancy but they are soft to the touch, therefore easily recognized.

Carcinoma of the Cervix. Cancer of the cervix is the easiest of all lesions to diagnose. They come in full bloom so that one might

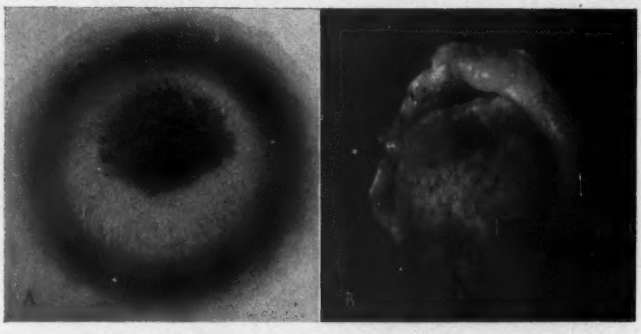


Fig. 5. Cancers of the cervix. A. Early cancer, involving only a segment of the os. B. More advanced lesion still involving but a segment.

almost say that if it is not obviously cancer it most likely is not. This of course is dangerous preachment but it is valuable in giving one a lead. Lesions so early as to offer diagnostic difficulties are excessively rare; in spite of our prating about early diagnosis one almost never sees them even in a really early stage. Even when seen early they offer little difficulty in diagnosis if one remembers but two things, hardness and tendency to bleed. In these two features, they

are not imitated by anything else under the sun. There is no more characteristic picture in all clinical medicine than this feel of early cancer.

Another characteristic but less constant sign is that but one segment of the cervix is involved (fig. 5, A). Such limited lesions are prone to become ulcerous or elevated before the entire circumference becomes involved (fig. 5, B).

Fig. 6. Carcinoma of the cervix. A. The lip of the cervix is replaced by the tumor. B. The tumor has invaded the entire cervix even to the adjacent vaginal wall. The cervical canal, *x*, seems to be free of invasion.

Even in more advanced lesions the chief growth occupies one part of the circumference and may completely destroy it leaving the remaining part of the circumference uninvolved (fig. 6). Of course when the lesion is advanced the entire circumference is involved and a wide ulcerating tumor displaces the cervix. Surely no one would miss the diagnosis in such cases.

Lesions of the Cervical Canal

The lesions most deceptive are those which have their location in the cervical canal. At an early stage they are not accessible either to inspection or to palpation.

Polyps of the Cervical Canal. A small polypoid growth the size of a pencil and an inch long having its origin in the cervical canal, usually near the internal os is one of the most common causes of bleeding near the menopause or beyond. The nature of the lesion is obvious at a glance. By means of a curet or an artery forceps it

is easy enough to determine its exact point of attachment. The question which must be determined is whether or not it is the only lesion present. Not infrequently there are more serious lesions present. If the polyp is firm (fig. 7, A) one must be suspicious that there is more trouble above. It is necessary to determine if there are other

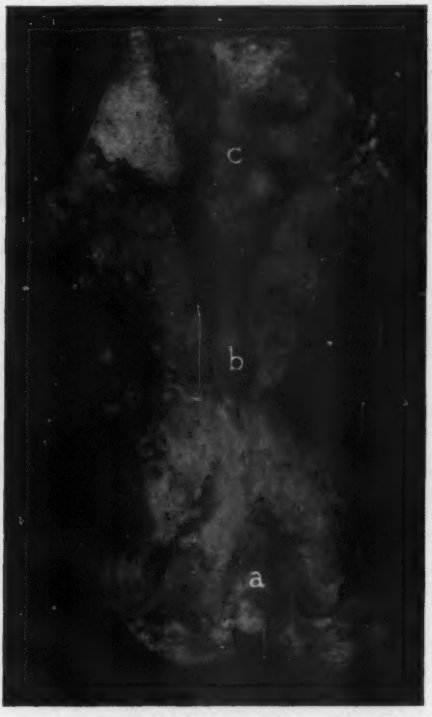


Fig. 7. Polyp of the cervix complicating carcinoma of the body of the uterus. Age 70. The cervix is long, the body the size of a parous uterus. There is a polyp at the cervix, *a*, one at the internal os, *b*, and a carcinoma at the fundus, *c*.

polyps in the cavity of the uterus. Sometimes other polyps are formed higher up (fig. 7, B). Even more important is the occasional association of cancer of body of the uterus (fig. 7, C). Such complications are of course uncommon but common enough to warn one against being satisfied with the finding of one lesion.

In uteri before the menopause the cervix may be dilated with the largest size Kelly dilator so that it is possible to palpate the interior of the uterus. If nothing is felt and the curet brings forth nothing and the bleedings have been limited to an annoying staining one may conclude that the body is free. If there is the least doubt the uterus

may be split so that the interior of the cavity of the uterus may be carefully palpated and inspected.

Carcinoma of the Cervical Canal. A not uncommon location for cancer is within the cervical canal. There is bleeding but one sees nothing to account for it. The cervix is smooth, or it may be the seat of erosion. The curet passed into the body of the uterus brings forth nothing.

Fig. 8. Adenocarcinoma of the cervix. The right lip contains a tumor the size of a marble. The covering epithelium is about to be destroyed. The cervical canal is already invaded. *Insert,* Diagrammatic presentation of the location of several other cases.

If one has a possibility of this lesion in mind he gives his attention to the curettage of the cervical canal. Care must be exercised lest the material brought forth with the curet be overlooked. It is fine and granular, hard to touch, but the intermingled blood may obscure these features. The lesion may invade the depth without destroying the surface (*Insert,* fig. 8). I once overlooked such a case. When examined a few months later the whole cervical lip was destroyed (fig. 8). The destruction within the cervical canal may be so extensive, before there is external evidence, that at operation the cervix may be almost wholly destroyed (fig. 9). The first evidence of such a cancer may be extensive invasion of the broad ligament.

If the cervix shows nothing and the body is smooth to the curet the proper procedure is to split the cervix so that the suspected area

is open for inspection and palpation. If negative it is a simple matter to put a few stitches in the incision made. If positive the removal of the uterus may be proceeded with. This does not apply to the postmenopausal uteri. In these the healing is so bad that after the splitting of the organ trouble is sure to follow.

Fig. 9. Extensive carcinoma of the cervical canal. The external os is free from invasion but the entire cervix above is destroyed.

Lesions of the Body of the Uterus

The lesions of the body of the uterus which cause bleeding are numerous and are both benign and malignant. It is exceedingly important to determine at the outset just with what we are dealing. Broadly speaking we may say that premenopausal bleeding is due to hyperplasia of the endometrium while recurrent bleeding after the menopause is likely due to malignant change. Such a diagnosis is useful as a working basis. The actual diagnosis must be made, tissue in hand.

Hyperplasia of the Endometrium. As above noted the most common cause of premenopausal bleeding is hyperplasia of the mucosa. It appears as a prolongation of an otherwise normal flow. The clinical history is usually so characteristic that one may proceed at once with operation without a preliminary diagnostic curettage. The operation must be so planned that the surgeon will be able to shift his procedure according to the findings.

The most common reason for the preliminary use of the curet is that the patient is sent to the surgeon with the statement from her doctor that a preliminary curettage will be done and the treatment

Fig. 10. Diffuse hyperplasia of the endometrium. Age 23. One child. Flowed without interruption for five months. The ovaries were enlarged, hard and made up largely of cysts indicating a relationship between the ovaries and the abnormal endometrium. The endometrium is many times the normal thickness, *x. Insert,* The mucosa does not depart much from the normal except in extent.

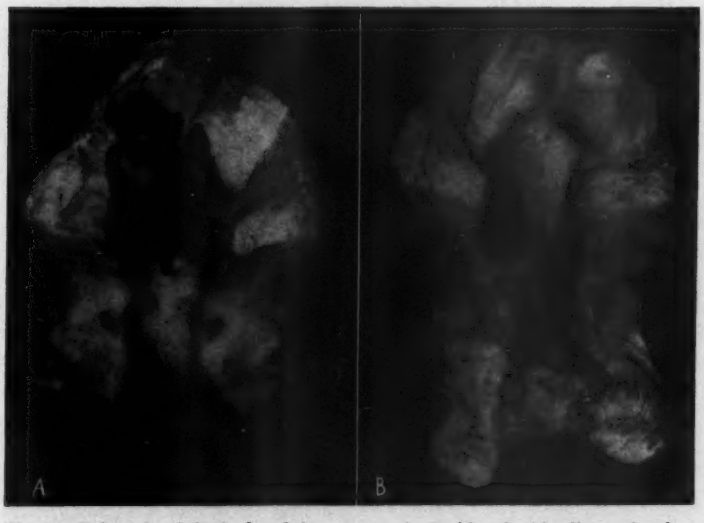


Fig. 11. Polyposis of the body of the uterus: A. Besides the bleeding polyp is a small myoma. B. Besides the polyp at the fundus there are many cysts at the internal os.

to be applied will depend on the findings. If not a cancer, some operation will be done or the x-ray will be used. One curets them to protect the doctor.

The curet produces a thickened endometrium and nothing else. The curet may fail to reveal other lesions, notably polyposis. When exposed at operation the mucosa is much thickened but is soft and

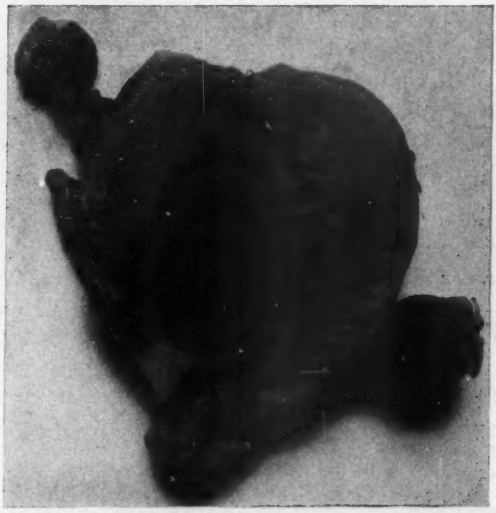


Fig. 12. Adenomyoma of the uterus. The endometrium is rough, papillomatous. The patient had been curetted twelve times in eighteen years by her family doctor. She was in good health twelve years after hysterectomy.

velvety (fig. 10). Instead of a diffuse hyperplasia of the endometrium there may be polypous formations (fig. 11). These may be small or large. One may thoroughly curet the uterus without dislodging such tumors, strange as it may seem. Because of this it is desirable to inspect the interior of the uterus so that the operation may be concluded by removing all the diseased tissue. The operation of defundation is the operation of choice because it permits the removal of all the endometrium including possible polyposis to within an inch of the internal os. This removes the bleeding part and yet leaves enough to carry on menstruation until the menopause has run its normal course. Formerly we were plagued by the formation of endometriomas after defundation but we have learned how to obviate this complication.

This method is preferable to the now popular x-ray treatment because it avoids the bringing on of an artificial menopause with the attendant nervous disturbances. Irradiation is convenient in very

fat women. These women present a more tedious operation and they display less nervous reaction from an artificial menopause than is the case in more nervous women. The more nervous the woman and the further she is from the normal menopause the more objectionable is irradiation. Certainly in every case an exact diagnosis must be made before irradiation is begun. Certainly inflammatory lesions and malignancy must be excluded.

In cases of polyposis after the menopause the uterus had best be removed because conservatism has little purpose.

Fig. 13. Early carcinoma of the body of the uterus. A. The upper body and cervix is free. A granular area, *x*, the mid portion was obviously malignant. B. A very small area just above the internal os, *x*, showed malignancy.

Adenomyomas of the Uterus. These are a common cause of bleeding but are usually easily identified because the uterus is uniform in outline and several times larger than the normal uterus (fig. 12). However, a body cancer may produce considerable enlargement.

Small adenomyomas, however, may cause no appreciable enlargement of the uterus and may not be demonstrable with a curet. Usually large masses of endometrium may be so removed. I once removed more than a pint. The curet is uncertain because a small area may have become malignant and even a thorough scraping may not discover it. Since the hyperplastic endometrium tends to recur supravaginal amputation becomes necessary sooner or later. I once

removed such a uterus which had been curetted eleven times by the same doctor.

Carcinoma of the Body of the Uterus. Bleeding which appears after the menopause has been passed a number of years is almost certain to be due to cancer of the body of the uterus. The only doubt is in cases when there are polypoid growths present. So commonly is this the cause of bleeding at this age that one will seldom go astray in assuming this diagnosis without further investigation and proceed to hysterectomy.

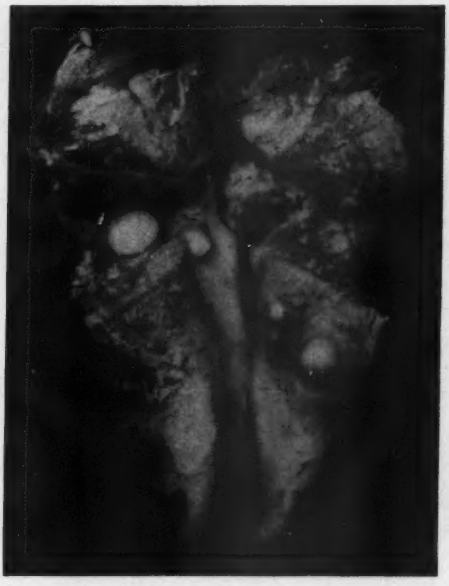


Fig. 14. Small cancer in one corner, *x*, so situated that it was inaccessible to the curet.

If the lesion is diffuse, therefore advanced, a confirmatory curettage is usually a simple though unnecessary procedure. If the lesion is small it may escape the curet (fig. 13). I would certainly not accept a negative curettage in a case of postmenopausal bleeding. The lesion may be so small as to escape the curet or the material obtained may be so small that it is lost in the blood. True, the density of such areas may be perceptible when palpated with a curet but if the areas are small this may escape notice. Furthermore the cancer area may be so small that they are inaccessible to the curet (fig. 14).

In most cases the uterus is larger than a menopausal uterus but this is by no means distinctive. A small atrophic uterus may harbor

a diffuse malignancy. The uterus is apt to be small if the patient has long passed the menopause.

Rare Lesions of the Uterus. Retention of the placenta may cause bleeding but this rarely causes any diagnostic difficulties either by exploration with the curet or better still by digital palpation.

Long retained areas of placenta which have become organized may present a tumor not easily distinguished. Generally speaking it has a definite line of cleavage and on section has a deep uniform brown color.

Syncytioma may resemble the organized placenta save that the endometrium is invaded and on section it is definitely grayish brown. Usually there is a history of a past hydatidiform mole which is sufficient to assure the diagnosis.

MANAGEMENT OF COMPLICATED FRACTURES OF THE FOREARM

WILLIAM BARNETT OWEN, M. D.

Louisville

THE dexterity of the hand and fingers are directly dependent upon the normal skeletal support of the two bones of the forearm with their muscular attachments. It is necessary that the normal anatomic relationship be continued as near normal as possible to permit function without pain.

In this paper I shall present an analysis of 185 cases of fractures of both bones of the forearm observed in the Louisville City Hospital Clinic during the last five years. There have been 371 cases of fracture of one or more bones in the forearm but in this series only the 185 fractures of the shaft of both bones of the forearm will be considered.

A brief resume of the surgical anatomy of the forearm is appropriate at this point:

The forearm, strictly speaking, is of little use except in that it serves as a pedestal support for the hand. The forearm is composed of two bones, whose anatomic features are diametric opposites. The ulna, with its greater mass proximally, functions as a main component of the forearm in the elbow articulation. This bone tapers gradually to its distal extremity which takes a very minor role in the articulation at the wrist. The dorsal surface of the ulna lies subcutaneous throughout its entire length. Conversely the radius, with its larger mass distally, forms the main articular component of the forearm at the wrist, and its shaft tapers gradually to end in a small articular surface which forms a very weak articulation with the components of the elbow joint. The radius is slightly curved laterally to facilitate its rotation around the ulna in the act of pronation. The radius is subcutaneous only in its distal third. The radius and ulna in the mid forearm are approximately the same size and have the same strength.

Between the radius and ulna lies a strong fibrous sheet of tissue, the interosseous membrane, with its fibers directed medially and upward from the radius to the ulna. This arrangement of fibers serves to transmit force exerted on the distal end of the radius over to the shaft of the ulna, and in a reverse to transmit force down the arm into the forearm over into the shaft of the radius. The inter-

---

From the Department of Surgery, University of Louisville School of Medicine.

Presented before the Postgraduate Surgical Assembly, the ninth annual meeting, of The Southeastern Surgical Congress, Louisville, March 7, 8 and 9, 1938.

osseous membrane is reinforced at its superior portion by the oblique ligament, the fibers of which run at right angles to the interosseous membrane and serve to check the forearm in a direction of extreme supination. The interosseous membrane remains tense in all rotary movements of the forearm. The movements of the forearm on the arm are largely controlled by the ulna while movements of the hand on the forearm are controlled, in main, by the radius. The forearm may be rotated through an arc of 160 degrees, the axis of which passes through the center of the head of the radius above and through the ulna styloid and ring finger below. In full supination the bones of the forearm are parallel while in full pronation the radial shaft lies across the ulnar shaft at the junction of its middle and upper thirds. The interosseous space is widest when the forearm is in a position of mid-pronation and supination while it is narrowest when the forearm is in a position of complete pronation.

The muscles of the forearm are divided into flexors and pronators which lie on the anterior and medial aspect of the forearm and the extensors and supinators which lie on the posterior and lateral aspect of the forearm. The flexors of the wrist and fingers may be divided into two groups, the superficial and the deep. All flexors of the fingers and wrist are supplied by the median nerve except the flexor carpi-ulnaris and the ulnar half of the flexor digitorum profundus. The pronators are two in number, the pronator teres and the pronator quadratus. The extensors of the fingers and wrist form one group and are all supplied by the radial nerve. The supinators are three in number, the strength of which is indicated in the order named, the biceps brachii, the supinator brevis and the brachioradialis. These are all supplied by the radial nerve except the biceps brachii which is supplied by the musculocutaneous.

Fractures of the forearm offer more mechanical difficulties than fractures in any other location in the body, the femur not excepted. In fractures of a single bone in the forearm no great amount of displacement is encountered due to the splinting action of its parallel fellow. In fractures of both bones of the forearm with displacement, all muscles of the forearm tend to pull the distal fragments upward. In addition to this the pronator teres, the pronator quadratus and the supinator brevis tend to pull the radius and ulna toward one another thereby obliterating the interosseous space. The brachioradialis tilts the radius so that the proximal end of the distal fragment moves inward toward the ulna; while the abductor and extensor muscles of the thumb, as they wind around the distal portions of the radial shaft along with the pronator quadratus tend to squeeze the distal fragments of the radius toward the ulna.

The anterior compartment of the forearm contains all the important nerves and blood vessels except the posterior interosseous nerve (deep branch of the radial) and the posterior interosseous artery. These structures in the posterior compartment of the forearm lie in close apposition to the interosseous membrane and are most likely to be injured in fractures of the radius and ulna.

The forearm, with its complicated mechanical constituents, represented by the muscular forces acting in several directional planes, including a wide range of rotary movement, taxes all of one's anatomic acumen in dealing with fractures occurring at various levels in the radius and ulna. Accurate reposition and coaptation of fragments entails a thorough understanding of the various distorting forces exerted by individual and collective muscular components. The interosseous membrane, checking separation of the radius and ulna throughout their entire length, must be duly considered in dealing with all fractures of the forearm and the maintenance of the interosseous space is almost mandatory in the successful handling of these fractures.

The dense fascial covering and septums offer difficulties both in reposition of fragments and from pressure due to hemorrhage into the fascial planes. Hemorrhage is usually great, due to the multiple nutrient arteries which supply the radius and ulna and usually occurs irrespective of trauma to soft tissue trauma.

Of the 185 cases it will be noted in the charts that there are 22 cases in which fracture of the radius and ulna occurred in the upper third. In one of those cases there was a compound fracture, in one paralysis of the posterior interosseous nerve; there were no non-unions and three mal-unions. There was good function and no pain in twenty cases. There was fair function with moderate degree of pain in two cases. There were fifty-nine cases of fracture of the middle third, three of which were compound fractures. There was one median nerve injury and two cases of non-union, one of the radius and one of the ulna. There were six cases of mal-union and one case of synostosis. In the case of non-union of the ulna with malposition of both bones, function was good. The patient was able to drive a truck; he refused further treatment. In the case of non-union of the radius, function was not known as the patient did not return. The case of synostosis had loss of pronation and supination; flexion and extension were normal. All of these cases were of the compound variety. Of the lower third, there were ninety-three cases, six of which were compound; there were no nerve injuries, no non-union, but eleven cases of mal-union.

A summary of the entire group of cases is as follows:

Untraced	6
Compound	14
Nerve injury	2
Non-union	3
Mal-union	23
Total	48

CASES WITH COMPLICATIONS

Good functional result	38
Poor functional result	4
Function unknown	6
	48

CLASSIFICATION OF CASES

Both bones, upper third	22
Both bones, middle third	59
Both bones, lower third	93
Unknown	11
Total	185

Colles' fracture	62
Reverse Colles	2
Single bone	
Radius, upper third	2
Radius, middle third	4
Radius, lower third	62
Ulna, upper third	11
Ulna, middle third	4
Ulna, lower third	9
Elbow joint injuries	12
Epiphyseal separation	15
Fracture of styloid radius	3
Total	371

FOREARM COMPLICATIONS—BOTH BONES—1933-1937 INCLUSIVE

No. of Cases	*Group-type*	*Compound*	*Nerve Injury*	*Non-Union*	*Mal-Union*
22	Upper third	1	1 (posterior interosseous)	0	3
59	Middle third	3	1 (median)	2—(1 radius (1 ulna	6 1 (synostosis)
93	Lower third	6	0	0	11
11	Unclassified	1	0	1 ulna	3

185—Total.

NERVE COMPLICATIONS

1. Upper Third Group—posterior interosseous nerve.	End result—limitation of motion, inability to make a fist.
2. Middle Third Group—median nerve.	End result—unable to flex thumb, index finger, loss of apposition of thumb.

Remarks: All non-union cases occurred in the compound fracture group. The case of synostosis occurred in the compound fracture group.

In the treatment of fractures of the forearm it is necessary to consider the location of the fracture.

First, consider a fracture of the radius above the pronator teres. The upper end of the radius is forced into the position of supination by the biceps and supinator brevis. This can not be controlled but the lower fragment can be placed in the position of full supination. In fractures of the radius below the pronator teres and above the quadratus the muscle balance is practically equal. In this instance a neutral position of the forearm is usually sufficient. Position and fixation is necessary for a sufficient period of time for complete union to occur: one may choose any method that does not interfere with the nerve and blood supply. When once satisfactory anatomic reposition has been accomplished it should be maintained until one is sure there is firm bony union before any attempt is made to institute physiotherapy. In addition to immobilization and position of the forearm and elbow, in some instances it is necessary to institute traction, preferably fixed traction. The surgeon should at all times bear in mind the desirability of simplifying complications rather than complicating simple methods.

The Southern Surgeon

Published Bi-monthly by

The SOUTHERN SURGEON PUBLISHING COMPANY

701 Hurt Building

ATLANTA

Subscription in the United States, $4.00

VOLUME VII DECEMBER, 1938 NUMBER 6

PULMONARY EMBOLISM

"—And from Sudden Death"

Only too often ten or twelve days after an operation, the repair of a hernia in a fat man of 50 for example, the patient who seems just about ready to go home all cured of what ailed him, meets with sudden death. A tragedy like this is harder on the family than death following a stormy postoperative course. It jolts the surgeon too: perhaps it was a case of this kind that gave rise to the layman's time-worn wisecrack to the effect that the operation was a success but—

Such a mode of exitus is apt to be attributed to heart disease nowadays; usually, however, it is due to massive pulmonary embolism. Pulmonary embolism, Barnes has reported, is responsible for 6 per cent of postoperative deaths in one famous medical center. Indeed Barnes has estimated that more than 3,000,000 persons now living in the United States will sooner or later die from this cause. It is therefore a subject demanding our best efforts.

Clinically, the patient is apt to be an obese person over 40, more commonly a woman, often with a damaged heart. The types of surgical procedures, in addition to herniorrhaphy, include prosta-

tectomy and other pelvic operations, cholecystectomy and partial resection of the stomach or colon. In 42 per cent of one series the operation was for cancer. About 6 per cent of deaths following childbirth are also due to embolism. It should be noted that death from this cause is almost unknown following thyroidectomy. One may expect fever for two or three days following any major operation. This may subside entirely and the patient appear to be getting along as well as could be hoped for. But then after a few days, as Claiborne has emphasized, there is a slight fever,—not apparently enough to cause alarm, perhaps not more than half a degree. Even a trifling elevation of temperature without obvious explanation present eight to ten days after a surgical procedure, regardless of whether it has been present each afternoon or whether it recurs after several days of normal temperature, should occasion deep concern. Often there is a sudden pain in the chest, usually described as a "catch in the side," that passes off in a few minutes. Gross objective evidence of phlebitis is a rare warning signal. A day or two later, perhaps on the day he is first allowed out of bed, the patient suddenly goes into shock, with or without dyspnea, with pallor, sweating, tachycardia, a precipitate drop in blood pressure, perhaps substernal oppression or pain back of the heart, vomiting and collapse. Perhaps even preceding the release of the embolus there is a subjective feeling of apprehension. Once the embolus lodges the patient is convinced that he is about to die. He has good reason to fear death for in more than half the fatal cases death occurs in a few minutes. Cyanosis is not necessary for the diagnosis, indeed pallor is more common at first. Blood-stained sputum, consolidation and friction rub may not appear for twenty-four hours, if at all.

Embolism is most apt to be mistaken for coronary thrombosis: the two conditions have much in common. If the patient survive the initial shock, cyanosis tends to be more severe in embolism. Increased pulsation may be noted over the pulmonary conus. A systolic murmur, accentuation of the pulmonic second, gallop rhythm and a friction rub may be found in the same area. Venous pulsation may be observed in the neck. However the pain is less agonizing than in coronary thrombosis, and it is more apt to be in the axillas and to be increased on respiration. Finally, as White discovered and as Barnes and others have corroborated, pulmonary embolism can be distinguished from infarction of the posterior wall of the left ventricle by the electrocardiograph.

If the exact cause of pulmonary embolism were known, it might be possible to prevent it. The consensus at this time is that the primary factor is stagnation of blood, particularly in the iliac veins and their tributaries. Direct trauma and infection may play a part. The Trendelenburg position for the first twenty-four hours after opera-

tion and inhalations of oxygen and carbon dioxide at frequent intervals continued for a day longer have been suggested. Deep breathing exercises are to be encouraged. The patient should be kept warm constantly and his legs massaged toward the body. First passive movements and later active movements of the legs are advised. Irving of the Boston Lying-In Hospital requires "bicycling" exercises of his obstetric patients from the time of delivery until dismissal with a reduction in the incidence of embolism. "Bicycling" exercises may sound strenuous but they can be carried out even in elderly persons after abdominal operations. Even though the patient should not become strong enough to continue them alone, the passive exercise will increase the local circulation. Barnes suggests that if such preventive measures seem too troublesome they might be omitted except in persons particularly prone to embolism.

If a small embolus is carried to the lung, the surgeon is confronted with a real problem. If he assume that a larger thrombus is waiting in the pelvic veins to be released by some slight movement by the patient, he should keep the patient as quiet as possible to forestall such an accident. On the other hand, enforced quietude may promote further thrombosis with almost certain death in the offing. The problem is not settled. Barnes says, "By no means would I have us give up, for example, deep breathing exercises, massage of the legs, or active and passive leg motions following that event, but I would postpone the time at which the patient is allowed bathroom privileges or allowed to be up." He advises particularly that bowel movements be made as easy as possible with mineral oil or small enemas.

Certainly however, the immediate treatment of non-fatal embolism should include papaverine hydrochloride (one half grain) for its antispasmodic effect, morphine for the relief of pain and anxiety, and several days of oxygen continuously for the anoxemia.

Thirty years ago Trendelenburg devised an operation for the removal of a massive pulmonary embolus. This operation was not successfully executed until Kirschner's classical case in 1924. In this instance, "eight minutes sufficed to make a correct diagnosis and decide about the operation, seven minutes for transportation and preparation and finally four minutes for the operative reestablishment of the pulmonary circulation." Up to 1932, 132 operations had been performed with a mortality of 93.2 per cent.

Nygaard has recently reviewed the cases of pulmonary embolism studied postmortem at the Mayo Clinic over a period of thirteen years. In 82.35 per cent of cases the correct diagnosis was made before the autopsy (which of course is not the same thing as saying that the definite diagnosis was made in a few minutes). In 252

cases the time from onset to death was known, but in only 106 did it exceed eleven minutes. Nygaard estimates that if optimal conditions had prevailed so that all of these 106 patients could have been submitted to operation, seven might have been saved.

While the researches of Nystroem in Europe and of Blalock in Tennessee keep hope alive, at the present time the Trendelenburg operation is not often feasible and when it is performed it carries an appalling mortality. It is therefore incumbent upon us now to secure more definite information as to the cause of pulmonary embolism, to employ every possible means to prevent the formation of the original thrombus. There is reason to believe that the incidence of pulmonary embolism may be lessened by the gentle handling of all tissues, the utmost respect for large veins, judicious placing of retractors, perfect asepsis in the field of operation and care not to interfere with the venous return from the legs by long continued pressure from stirrups or otherwise during operation. After operation it is our duty to watch the postoperative course of our patients most carefully to detect premonitory signs of embolism and to redouble our efforts when such signs are detected.

REFERENCES

1. Barnes, A. R.: Pulmonary Embolism, J. A. M. A. *109:* 1347 (Oct. 23) 1937.
2. Claiborne, T. S.: Pulmonary Embolism in Retrospect: Report of 6 Cases, S. Clin. North America *15:* 1635 (Dec.) 1935.
3. White, P. D.: The Acute Cor Pulmonale, Ann. Int. Med. *9:* 115 (Aug.) 1935. McGinn, Sylvester, and White, P. D.: Acute Cor Pulmonale Resulting from Pulmonary Embolism: Its Clinical Recognition, J. A. M. A. *104:* 1473 (Apr. 27) 1935.
4. Nygaard, K. K.: Pulmonary Emboli: Consideration of Clinical Diagnosis and Possibilities for the Trendelenburg Operation, Proc. Staff Meet., Mayo Clin. *13:* 586 (Sept. 14) 1938.

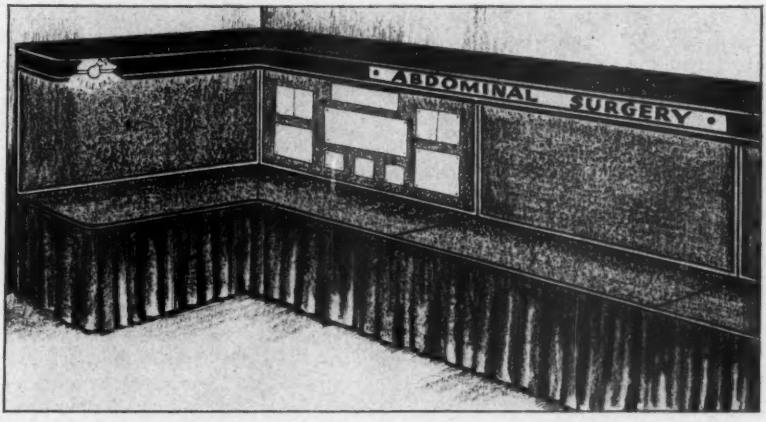
SCIENTIFIC EXHIBITS

The Southeastern Surgical Congress

Atlanta Biltmore Hotel

March, 1939

For the convenience of the exhibitors the Committee on Scientific Exhibits has designed the booth shown in the diagram. These booths are built on modernistic lines, the wall space and shelf will be covered with green burlap. The lighting will be indirect and ample. It is proposed to group the exhibits according to their subject and it is hoped to have one section devoted to the treatment of injuries incurred in automobile accidents.



The wall space is four feet high: the length will depend on the need of the exhibitor. The shelf is two feet wide. Charts, photographs and graphs can be put on wall space with thumb tacks—specimens and models can be placed on the shelf.

The cost will be approximately $1.50 per linear foot.

One room will be devoted to moving pictures, with two 16 mm. projectors and a professional operator in constant attendance. It is proposed to run a continuous program of pictures. Surgeons who desire to exhibit are requested to communicate with the Chairman, stating the title of their picture, its approximate length and whether sound or silent. Those who may have 8 mm. film will probably have to supply their own projector. When transparent screens for x-rays, special booths for balopticons, etc., are needed, please correspond with the Chairman in regard to space and cost of same.

To insure uniformity your title, name and address will be lettered on cards of standard size.

For further information write to the Chairman of the Committee on Scientific Exhibits,

FRED F. RUDDER, M.D., 478 Peachtree Street, N. E.

REGIONAL MEETINGS

For the past four years the Fellows of The Southeastern Surgical Congress in South Carolina have put on a one day clinical program at the Anderson County Hospital as part of the three day clinical program put on by the Piedmont Postgraduate Assembly. The latter organization was formed as a result of a series of lectures on obstetrics given at the Anderson County Hospital by Dr. J. R. McCord of Atlanta some five years ago. Since that time, about the middle of September each year, the Piedmont Postgraduate Assembly has met in Anderson. The sessions are held in the afternoons and evenings. This year the first day program was devoted to pediatrics. Dr. F. R. Wrenn, radiologist at the Anderson County Hospital, gave an instructive talk on cancer of the skin, presenting on lantern slides a large amount of clinical material taken from patients treated by him at the Anderson County Hospital. Dr. J. R. Young made a further clinical report on appendicitis at the Anderson County Hospital over a fifteen year period. This was an institutional report and not the work of one single surgeon. Particular emphasis was placed on an analysis of 895 cases operated upon during the last two years which had not hitherto been reported.

The program which the Fellows of The Southeastern Surgical Congress sponsored was on the third and last day of the meeting. We were extremely fortunate this year in getting two outstanding teachers, Dr. Frank Lahey of Boston and Dr. R. L. Sanders of Memphis. At the afternoon session Dr. Lahey discussed anesthesia. Dr. Sanders spoke on the common diseases of the colon. After an early evening banquet Dr. Lahey spoke on the diseases of the thyroid gland, and Dr. Sanders discussed diseases of the gallbladder. The one hundred fifty doctors and nurses who attended these meetings were uniformly enthusiastic in their comment and they expressed the hope that we might have these men with us in some future meeting. As President-Elect of the Congress Dr. Sanders emphasized the fact that one aim of The Southeastern Surgical Congress was to stimulate interest in postgraduate study and to assist in providing opportunity for postgraduate study. He pointed out that the Congress was endeavoring to fulfill this aim by its three day annual meeting in some key city of the Southeast each spring. The publication by the Congress of a first class surgical journal, THE SOUTHERN SURGEON, was another means used in carrying out the purpose of the Congress. He emphasized the importance of this third method, namely; clinical meetings by the Fellows of the several states. Such meetings in Florida, Georgia, and South Carolina have been very successful and he thought that these contributed to the carrying out of the main purpose of the Congress.

In the opinion of the Fellows of South Carolina there is a definite advantage in grafting such a clinical program onto the program of some other medical meeting. In this way the appeal is wider, a wider range of medical instruction is offered the general practitioner, and the surgeon has an opportunity of learning the latest thought in various fields of medicine. We think that the definition of the late Nicholas Senn, "A surgeon is a physician who knows how to operate" is still true and that the more a surgeon knows about the general field of medicine the better surgeon he is, and the more a physician knows about the indications for surgical treatment and principles of surgery the better physician he is. Few of us today are rugged individualists enough to grasp and carry out the concept of Hertzler who in his recent *Horse and Buggy Doctor* gave his views on postgraduate study. In his opinion only three things were essential—First, material, or the patient; secondly, books, which he stated were needed in inverse

ratio to one's experience; thirdly, the will to do. The joker in this formula is in the last ingredient! How many doctors today would have the intestinal fortitude (not to speak of the time) to become anatomists, bacteriologists, pathologists, and linguists in order that we might become better surgeons? That was the method followed by this man Hertzler. Most of us are quite content to be much less strenuous, even complacent, in our pursuit of postgraduate study. In this particular at least we are quite homeopathic, that is we prefer to take frequent pleasant doses of the "active principle" of medical truth as presented by a wise teacher of rich clinical experience. The meeting just held in Anderson at which Drs. Lahey and Sanders were our teachers furnished a rich opportunity for just this form of postgraduate study.

The Southeastern Surgical Congress is proud of the state meetings that Georgia, Florida and South Carolina have been holding annually for several years. It is perhaps more proud that Alabama and Tennessee are beginning such meetings this year: it hopes that before long each of the component states will follow suit.

The program of the Georgia meeting in August was as follows:

Appendicitis, by Dr. J. C. Patterson, Cuthbert
Tumors of the Breast, by Dr. J. L. Campbell, Atlanta
Hernia, by Dr. Fred Waas, Jacksonville, Fla.
Pelvic Inflammatory Disease, by Dr. Kenneth Hunt, Griffin
Diseases of the Biliary System, by Dr. R. L. Sanders, Memphis, Tenn.
Fractures of the Neck of the Femur, by Dr. T. P. Goodwyn, Atlanta
Skin Graft, by Dr. W. G. Hamm, Atlanta
Acute Mastoid Conditions, by Dr. Murdock Equen, Atlanta
Ureteral Colic, by Dr. Wallace Bazemore, Macon.

It may be emphasized that no papers were read at this meeting. The physician-hosts presented cases to provide the visiting speakers with his text.

We regret that we have no details available of the Florida meeting at the State Hospital in Chattahoochee. Dr. Gerry Holden, Dr. J. S. Turberville and Dr. T. C. Davison were among the speakers there.

At all three of these meetings more than a hundred physicians were in attendance. This is sufficient evidence of the need of these meetings. There is no better way of carrying on postgraduate surgical education, the primary object of the Congress, than to carry it to the doctor's own door.

BOOK REVIEWS

The Editors of THE SOUTHERN SURGEON *will at all times welcome new books in the field of surgery and will acknowledge their receipt in these pages. The Editors do not, however, agree to review all books that have been submitted without solicitation.*

THE HORSE AND BUGGY DOCTOR. By ARTHUR E. HERTZLER, M.D. 322 pages, with 10 illustrations. Price, $2.75. New York and London: Harper & Brothers, 1938.

The small boy of today, if one may trust a poll recently conducted by some inquisitive professors, no longer wishes to drive a locomotive nor to be a fireman or cowboy: rather he is undecided whether he will make of himself an aviator or a doctor. This juvenile apotheosizing indicates that all the recent blasts of our enemies have not altogether ruined the standing of the physician in the eyes of the public, much as we may sometimes fear it.

In keeping with this sentiment, it is cheering to know that a doctor's autobiography has been among the six best sellers of the last four months. To those of us who have enjoyed Dr. Hertzler's papers and clinics before the Postgraduate Surgical Assembly of The Southeastern Surgical Congress the past four years, and to the larger number who have read his papers in the pages of THE SOUTHERN SURGEON or his various scientific monographs, it will not be surprising to learn the identity of the author. Much as the layman enjoys the book, it takes a doctor to appreciate fully some passages, and he will chuckle on nearly every page and laugh aloud in spots. Dr. Hertzler does not hold the medical profession (or at least some members of it) sacrosanct, and in spots he seems to betray some of our professional secrets, so an occasional physician may wish there had been a few deletions before the book was offered to the general public. To the reviewer, however, his ingenuousness is not distasteful: indeed to him anything that Dr. Hertzler says is o. k., if for no other reason than that he said it.

Following the example of the Journal of the American Medical Association, we offer a few samples:

> A gynecologist is an unfortunate individual whose mission in life it is to aid the human female to correlate her biologic instincts with the dictates of Christian ethics.
>
> Such superficial courses only detract from the things worth while. The latest of these courses is medical sociology. The next course, I predict, will be a course in medical hemstitching and doily making. These courses will be valuable in enabling the doctor to contact the neglected ladies.
>
> Yet after all it is quite possible that if the young doctor of today had to make great sacrifices to reach his patient, and then sit for hours watching the course of the disease, he might have a more understanding view of the sick human. At any rate, if so occupied the commercial side of medicine would not loom so large. Besides, few doctors of the bygone day died of heart disease as is the case now, be the cause what it may. The respectable way for the old-time doctor was to acquire pneumonia after an exposure and die on the fourth day while, in his delirium, he urged his team onward. Giddap Jack!
>
> The country doctor cannot bluntly refuse a call just because the patient is a confirmed and joyous deadhead. People of this class do sometimes die, though I cannot at this time recall a case.

I have always refused to attend a drunk with a headache. I figure that he might as well suffer from the present headache as from the one he will acquire as soon as he is relieved. This may sound complicated to some persons but it will be perfectly clear to others, I am sure.

Of all the animals that inhabit the earth the neurasthenic male is the most pestiferous.

Those without medical care are so because they elect to do without it. Stubborn dumbness stands in their way. Who judges whether or not there is adequate medical care? It is wrong assumptions here that are leading to disastrous conclusions. Those who are able to judge come to no such conclusion.

That rare doctor who does not wish to read this book will probably be forced by his patients to read it anyway. It constitutes excellent propaganda, by the way, against state medicine.

OUTLINE OF ROENTGEN DIAGNOSIS: *An Orientation in the Basic Principles of Diagnosis by the Roentgen Method.* By LEO G. RIGLER, M.D., Professor of Radiology, University of Minnesota. Philadelphia, London, Montreal, New York: J. P. Lippincott Company, 1938.

The atlas contains 254 illustrations shown in 227 figures, presented in drawings and reproductions of roentgen diagrams. Figures 6 to 51 and 55 to 72 are drawings in an original technic by Jean E. Hirsch.

A few important statements of the author are quoted.

1. "The roentgen ray affords a means of actually viewing concealed parts of the body and obtaining a visual picture of their condition."
2. "The roentgenologist is, therefore, somewhat in the position of the gross pathologist, for he is actually looking upon the pathological changes which take place in certain organs."
3. "We must guard against too many conceptions of x-ray diagnosis. One holds that it is worth little or nothing. The other is that it is the final word on all cases and supersedes all other findings."
4. "X-ray diagnosis may be considered a highly specialized part of physical diagnosis for it represents in fact only a part of the physical method of inspection."

This volume is an outline of x-ray diagnosis and the author has done a good job. The pictorial atlas is especially valuable for comparative study. B. T. B.

INDUSTRIAL SURGERY: PRINCIPLES, PROBLEMS AND PRACTICES. By WILLIS W. LASHER, M.D., Assistant Professor of Traumatic Surgery, New York Post Graduate Medical School, Columbia University, etc. 193 illustrations. New York: Paul B. Hoeber, Inc., Harper and Brothers, 1938.

Dr. Lasher states in the preface of the book "To assume that industrial surgeons study and treat their patients in a superficial manner is entirely erroneous." This statement taken as a whole is in accord with the experience of most industrial surgeons, particularly those who, like Dr. Lasher, make industrial surgery a specialty. Dr. Lasher's experience as an industrial surgeon emi-

nently qualifies him to write a book on industrial surgery as those who read this volume can testify.

The reviewer respectfully recommends this book, not only to the industrial surgeons, but the general surgeon and particularly to the orthopedists.

B. T. B.

PLASTIC SURGERY. By ARTHUR JOSEPH BARSKY, M.D., D.D.S., Associate Surgeon in charge of the Department of Reconstructive Surgery, Beth Israel Hospital, New York City; Adjunct Professor of Plastic Reparative Surgery, New York Polyclinic Medical School and Hospital; Associate Plastic Surgeon to the Morrisania City Hospital, New York City; Plastic Surgeon to the Beth El Hospital, Brooklyn, New York; Consulting Plastic Surgeon to the New York State Reconstruction Home, West Haverstraw, New York. 355 pages with 432 illustrations. Price, $5.75. Philadelphia and London: W. B. Saunders Company, 1938.

Dr. Barsky's book is a very complete text on plastic surgery. Its illustrations, including both pictures and diagrams, show all that is desired of them. The style is easily readable and the subject matter is presented in such a fascinating manner that one's interest is held throughout the book.

Although the chapter on the treatment of wounds, burns and frostbite is short, the handling of the subject is so adequate that a thorough sudy of this chapter would help many a general practitioner and surgeon. The chapters on the special fields, such as the orbit, nose, etc., will be helpful to both the general practitioner and to the specialist in the field of plastic surgery, because their content leaves little to be desired. Since the whole field of plastic surgery is covered by Dr. Barsky, this book will be a useful addition to any doctor's library, whether he be surgeon, pediatrician, or general practitioner. J. G.

THE PNEUMONIAS. By HOBART A. REIMANN, M.D., Professor of Medicine, Jefferson Medical College, Philadelphia; Formerly Professor of Medicine, University of Minnesota, etc. 381 pages, with 111 illustrations. Price, $5.50. Philadelphia and London: W. B. Saunders Company, 1938.

Dr. Reimann's thesis is that pneumonia should be recognized by the general clinical picture without waiting for frank signs of extensive consolidation, and that the most important thing about the diagnosis of pneumonia is to determine the type of organism responsible. He is an earnest advocate of the serum treatment of those types of pneumococcus pneumonia in which serum has been proved valuable. While admitting that serum is still expensive, he argues that, in shortening the period of hospitalization and of special nursing and in lessening the chances of empyema and other complications, serum treatment is really economical. It is a most valuable book.

GUIDING HUMAN MISFITS. A PRACTICAL APPLICATION OF INDIVIDUAL PSYCHOLOGY. By ALEXANDRA ADLER, M.D., Research Fellow in Neurology, Harvard University; Assistant in Research, Boston City Hospital. 88 pages. Price, $1.75. New York: The Macmillan Company, 1938.

This little book reminds us of a saying attributed to Abraham Lincoln, "It is a very fine dog for those who like that kind of dog." In spite of its excellence, it is not likely to prove of much interest to practicing surgeons.

Review *of* Neoplasms

formerly

The Review of Tumor Therapy

HILLYER RUDISILL, JR., M. D.
Compiler

J. HAMPTON HOCH, D. Sc.
Assistant Compiler

Material for this Department should be sent to
P. O. Box 508, Charleston, S. C.

RADIOLOGY

A major deficiency in American radiation therapy is emphasized by Pugh[1] in an article discussing the relationship of physics to clinical radiation dosimetry. It is in only a few of the largest cities and university hospitals that American radiologists have the privilege of adequate cooperation and consultation with skilled radiation physicists. On the other hand in practically all the larger European countries there are physicists and biologists attached to each treatment center. American radiology has not allowed itself to be hampered: our radiologists have familiarized themselves sufficiently with radiation physics and radiation biology to become good practical clinical therapists, and to follow well and sometimes to extend the application of technics that have been worked out in European centers. However, with the great progress that American medicine and surgery have made along so many lines, it is not idle to suppose that when radiologists in this country can receive more complete technical assistance they may be able to bring radiation therapy out of its present fetal stage to a field of greater usefulness. I purposely use the term "fetal stage of radiation therapy" for as long as competent radiologists can get equal results in many types of malignant tumors from a single massive dose of x-ray or from a protracted fractionated series extending over a month or more, the radiologists of the world have much to learn. The more assistance we receive the sooner we will be able to extend our knowledge.

In the literature of the past few months, carcinoma of the cervix continues to receive the attention that this incompletely solved problem warrants. Norris and Block[2] and Miller and Folsome[3] give excellent discussions of this important subject. The latter two have made an extensive follow-up study of cancer of the cervix treated by radiation in the State of Michigan. They analyze in detail the occurrence, clinical classifications, type and amount of radiation with the results tabulated both as to morbidity and survival. They touch on the very important points of lay education and cancer prevention

and end with a paragraph titled "Whither Now?" In answer to their own question they cast a definite doubt on the now generally accepted maxim of treating all cervical cancer by radiation, with the following,

> Perhaps the swing from surgery to radium and x-ray has been too complete for the good of all concerned. . . . Unless prolonged follow-up study of early cases treated by means of radiation can show permanency of cure equaling that of surgery, it would appear that for these early cases, a return to surgery of adequate character is highly desirable.

The discussion of Miller and Folsome's paper brings out the perplexities and questions, as well as the opinions, of several noted gynecologists and radiologists. Anspach dogmatically states that the operative treatment will completely disappear and implies that, since radiation is universally recognized as sometimes producing a cure, its failures are the result of inadequate therapy. (With this thought I am heartily in accord and the greatly improved results coming from the application of a preliminary x-ray series followed immediately or in a very few days by heavily filtered radium seems to be proving this.) Schumann and Behney believe that the "five year cure" is an artificial and inadequate yardstick and that more importance should be attached to individualizing the treatment in order to decrease the present high morbidity in arrested cases that prevents women from returning to a useful life. Pfahler sounded a note of optimism for palliation and occasional regression in hopeless cases, with radiation. Tracy makes the very important statement, "I have never believed in a standard dosage of radiation any more than I believe a patient should be made to fit some special operative technique." He also agrees with Pfahler that every patient should be given the benefits of radiation since occasionally an apparently hopeless case will be cured.

Norris and Block discuss the results of radiotherapy in carcinoma of the cervix and offer some comparisons of the results with radiation, with radiation and operation, and with surgery alone. They also describe several technics of radiation therapy used in large series of cases. These technics are tabulated here, although not in the original article, and the exact method of application of the radiation plus earlier diagnosis seems to be the key to this tremendous problem.

Striking in this tabulation is the deplorable lack of use of preradium x-irradiation, the lack of anything like standardization of the radium technic and the impunity with which radium needles are stuck in or adjacent to cancerous tissue. In spite of the hodgepodge state of radiation therapy of carcinoma of the cervix the results show that a great many women's lives are saved from this terrible malady and it also shows that when the correct standardized technic is worked out, a great many more lives will be saved.

Place	*Physicians*	*Radium*	*X-ray*	*Results* No. of Pts.	5 Yr. Cures
Buenos Aires	Ahumda, Prestini and del Togno	Intrauterine plus colpostat. If cervix obliterated radium needling used to create a canal and then above done.	NONE.	607	Group 1...94.1% Group 2...40.8% Group 3...18.9% Group 4... 0. All groups 28.5%
Mayo Clinic Rochester	Bowing and Fricke	50 mg. placed in cervix, repeated several times, "broken dose method."	Usually semi-intensive after radium applications.	1491	Group 1...69.2% Group 2...60.2% Group 3..... Group 4..... All groups 26.8%
Memorial Hospital New York	Healy	10-14 days after x-rays 1000-2000 mg. hrs. given to vaginal side of cancer and following day radium capsules are used in canal for 2000 mg. hrs. at cervix and 1000 supracervical.	Precedes radium with 700 r to each of 4 pelvic fields. Eight weeks after radium the x-ray series is repeated.		NONE GIVEN
Woman's Hospital New York	Ward and Sackett	100 mg. in cervix and several 12.5 mg. needles inserted at junction of fornix and cervix. Dose of 3600 to 4800 mg. hrs. given. lapsed by retention Bladder is kept col-catheter.	NONE.	595	Group 1...56.2% Group 2..... Group 3..... Group 4..... All groups 28.5%
	Pitts and Waterman	Twelve to sixteen 2 mg. needles inserted at sides and front and in back of the cervix. 20 to 50 mg. placed in cervix at same time and left 144 to 168 hrs.	NONE.		They state that by the addition of the radium needling the percentage of cures has been increased in all groups but particularly Group 3, where 5 yr. arrests have risen from 14 to 29%.

The great interest, shared by the laity, that has existed in brain tumors and the wholehearted pessimism among the profession as to therapy makes the article by Eden[4] on gliomas sound a note of cheer. After describing a case of "mixed-cell glioma of uncertain nature" Eden discusses the ability of gliomas to metastasize by way of the cerebrospinal fluid and more specifically discusses medulloblastomas. In closing he states,

> Once the diagnosis is established the only rational treatment is deep x-ray therapy to the central nervous system, in view of the extreme sensitivity of such tumours as the cerebellar medulloblastoma. Our experience in this hospital (University College Hospital, London) of a case of cerebellar medulloblastoma with irradiation of the primary tumour which was followed a few months later by spinal subarachnoid invasion, emphasized the importance of irradiating all parts of the nervous system.

A similar case was observed by me at the University of Chicago a few years ago: After Dr. Percival Bailey had explored and removed tissue for biopsy, x-irradiation was applied to tumor. The lad died however about six months later. At autopsy no trace of the primary tumor could be found but the spinal cord was riddled with the fatal secondary growths. The cord had not of course been irradiated.

In the extensive dissertations on lung neoplasms by Edwards,[5] Koletsky[6] and Holman and Duff[7] there is only an occasional casual mention of radiation. Lung cancer, however, offers a theoretically promising field for radiation therapy and it is my belief that every patient with this disease should be given the benefit of irradiation either preoperatively or as the sole method of treatment; particularly since any portion of the lung can be easily crossed-fired and the percentage depth-dose here is higher than anywhere else in the body.

Harris and Klemperer[8] again support the thesis that seems so hard to get over to all interested, i. e. the degree of radiosensitivity of neoplasms of the pharynx and larynx cannot be determined from the histologic picture but is entirely dependent on the particular part of the upper air passageways from which the growth arises. For example carcinomas of the anterior pillars of the tonsil are radio-resistant, no matter what the microscopic picture, while those of the tonsil proper are sensitive to radiation. This is forcefully shown in the first illustration of a new textbook on radiation therapy by Delario.[9]

Two articles describing malignant tumors that are radiation-sensitive, irrespective of their location, complete this summary of recent important radiologic literature. Fitzhugh[10] completely reviews lympho-epithelioma (Schmincke's tumor); he points out that while it usually occurs in the hypopharynx or other parts of the upper

respiratory and alimentary tracts, it may be found in any organ in which there is lymphocytic infiltration of the submucosa. Fitzhugh adds five new cases to the one hundred fifty odd already reported, and concludes with the statement that pronounced metastases may mask the primary growth which is "often overlooked and is extremely difficult to find"; histologic differentiation is difficult and that the tumors are radio-sensitive.

Leedham-Green, Bromley and Raban[11] add two new cases of plasmocytoma or solitary myeloma of bone to the nineteen previously reported. In both of their cases the innominate bone was involved and in both a cure was apparently effected by x-irradiation.

HILLYER RUDISILL, JR., M.D., F.A.C.P., F.A.C.R.

REFERENCES

1. Pugh, R. E., Jr.: Physics: Its Application to Roentgen Therapy, California & West. Med. *49:* 194 (Sept.) 1938.
2. Norris, C. C., and Block, F. B.: Irradiation in Cervical Cancer, Am. J. M. Sc. *196:* 589 (Oct.) 1938.
3. Miller, N. F., and Folsome, C. E.: Carcinoma of the Cervix, Am. J. Obst. & Gynec. *36:* 545 (Oct.) 1938.
4. Eden, K. C.: Dissemination of a Glioma of the Spinal Cord in the Leptomeninges, Brain *61:* 298 (part 3) 1938.
5. Edwards, A. T.: Tumors of the Lung, Brit. J. Surg. *26:* 166 (July) 1938.
6. Koletsky, Simon: Primary Carcinoma of the Lung, Arch. Int. Med. *62:* 636 (Oct.) 1938.
7. Holman, W. L., and Duff, G. L.: Primary Carcinoma of the Lung, Am. J. M. Sc. *196:* 436 (Sept.) 1938.
8. Harris, William, and Klemperer, Paul: Pathologic Differentiation Between Radiosensitive and Nonradiosensitive Malignant Neoplasms of the Larynx, Arch. Otolaryng. *28:* 355 (Sept.) 1938.
9. Delario, A. J.: A Handbook of Roentgen and Radium Therapy. Philadelphia: F. A. Davis Company, 1938.
10. Fitzhugh, W. A., Jr.: Lymphoepithelioma, Arch. Otolaryng. *28:* 376 (Sept.) 1938.
11. Leedham-Green, J. C.; Bromley, J. F., and Raban, John: Plasmocytoma of the Innominate Bone, Brit. J. Surg. *26:* 90 (July) 1938.

SURGERY

Carcinoma of the lung has received a great deal of attention in the 1938 literature. Two facts stand out; an apparently greater incidence in recent years and the possibility of cure by surgical extirpation. Edwards[1] has reviewed the entire subject of lung tumors in the current *British Journal of Surgery*. The anatomy and surgical technic are well illustrated. Edwards believes that the dangers of operation on a widely opened thorax without positive pressure anesthesia are much exaggerated unless cough occurs. He points out the advantages of preliminary pneumothorax performed two to four weeks before pneumonectomy. If carcinoma of the lung should be clinically operable, exploratory thoractomy is indicated with a view to radical operation. Of Edwards' twenty explored cases pneumonectomy was possible in thirteen. As Overholt[2] and others have pointed out the less radical operation of lobectomy is not often feasible because of the position of the lesion in or near the main stem bronchus. Matson, Roberts and Biaillon[3] reported twenty-eight patients still alive of forty-seven collected cases of pneumonectomy for carcinoma.

The entire current number of the quarterly *Acta, de l'Union internationale contre le cancer* is devoted to carcinoma of the lung. A marked increase in the incidence of pulmonary cancer is reported by Bonser[4] in Great Britain and by Fabris[5] in Venice. Fischer-Wassels[6] from Germany believes that the breathing of dust containing tar compounds and the excessive use of the cigarette may be suspected as contributing to this increase. Alwens and Jonas[7] describe twenty cases occurring in chrome workers. An editorial in the *British Medical Journal*[8] indicts as etiologic factors the inhalation of dusts containing the heavy metals, bismuth, nickel, cobalt and arsenic. Vorwald and Karr[9] at Saranac found no relation between pneumoconiosis and pulmonary carcinoma. They conclude that inhaled dusts, except those containing such recognized carcinogenic substances as radium and tar, cannot be considered etiologic factors. Four of the five cases reported by Faget and Harmos[10] smoked at least two packages of cigarettes per day. Fried[11] in his report of 152 autopsied cases is inclined to the view that the increase is more apparent than real. Stein and Joslin[12] describe the findings in 164 cases at the Hines Hospital. They note that the percentage of total admissions having bronchiogenic carcinoma rose from 1.7 per cent in 1931 to 6.5 per cent in 1936. It is pointed out that improved diagnostic methods may explain this increase. (This hospital is devoted to veterans of the World War and its clientele was therefore five years older in 1936. *Editor.*)

Widespread metastases are not usually an early event in carcinoma of the lung. Orten[13] describes a case with extensive metastatic involvement of the myocardium. Invasion through the pleura to surrounding structures often renders a case inoperable. Those at the apex may give rise to the superior pulmonary sulcus syndrome or even simulate subacromial bursitis as described by Nathanson[14]. Stein[15] found the average duration of life to be only thirteen months in twelve cases of apical lung tumors. He found no appreciable relief of pain from x-ray therapy. This is in contrast to the palliation after irradiation that Stein[2] observed in lung cancer generally. Brunschwig[16] reported at the recent Congress of the American College of Surgeons that even metastatic tumors in the lung may be benefited by palliative irradiation. Bartsch and Waschner[17] pointed out that massive single doses of x-ray may cause injury to the heart and coronary vessels. This may be avoided by the use of protracted fractional doses.

Several important papers on carcinoma of the large bowel have appeared. Gilchrist and David[18] studied the lymphatic spread of carcinoma of the rectum in specimens removed at operation, injected, and cleared. They found metastases to lymph nodes in 68 per cent of all specimens although only 48 of 110 involved nodes showed any gross change. They found also that gross enlargement of high lying nodes with lymph blockage may cause retrograde spread. These findings are in support of the Miles type of operation. Keyes[19] has reported that both internal iliac arteries may be ligated without danger. The rectum may then be removed from above without danger of hemorrhage and the patient spared the shock, pain, prolonged healing of the posterior approach in selected cases. Cattell[20] advocates palliative resection even when extension has occurred. He states that resection would seem justified in any patient who is a reasonable operative risk, who has an expectancy of life over twelve months, and in whom it appears technically feasible.

Hosler and Murphy[21] describe two cases of malignant perineal tumor simulating inflammatory conditions. The inflammatory appearance can be explained on the basis of lymphedema resulting from lymph blockage. Crile[22] reports a successful resection of the head of the pancreas for carcinoma. Kretschmer[23] discusses multiple primary cancer of the genito-urinary system and reports five cases. Leddy and Desjardins[24] report the results in 314 cases of malignant tumors of the testis. Their figures show 61 per cent five year survivals in cases without metastases and 31 per cent with metastases. Orchidectomy is followed by irradiation of the entire abdomen, mediastinum, and left supraclavicular region. Tucker and Hellwig[25] emphasize the value of routine microscopic examination in proctologic prac-

tice. One third of their malignant lesions were discovered by histologic study of clinically benign lesions of the anal region.

F. E. KREDEL, M.D., F.A.C.S.

BIBLIOGRAPHY

1. Edwards, A. T.: Tumours of the Lung, Brit. J. Surg. *26:* 166 (July) 1938.
2. Overholt, R. H.: Surgical Treatment of Carcinoma of the Lung, Surg., Gynec. & Obst. *64:* 209, 1937.
3. Matson, R. C.; Roberts, J. M., and Biaillon, M.: Total Removal of Right Lung for Bronchiogenic Carcinoma, Dis. Chest *4:* 43 (June) 1938.
4. Bonser, G. M.: The Incidence of Intrathoracic Cancer in Great Britain, Acta, Union internat. contre cancer *3:* 119, 1938.
5. Fabris, A.: Rilievi sul Tumore Primitive Del Pumone, Acta, Union internat. contre cancer *3:* 130, 1938.
6. Fischer-Wassels, B.: Das Primaere Lungencarcinom, Acta, Union internat. contre cancer *3:* 140, 1938.
7. Alwens, W., and Jonas, W.: Der Chromat-Lungenkrebs, Acta, Union internat. contre cancer *3:* 103, 1938.
8. Editorial: Cancer of the Lung, Brit. M. J. *185:* 4046 (July 23) 1938.
9. Vorwald, A. J., and Karr, J. W.: Pneumoconiosis and Pulmonary Carcinoma, Am. J. Path. *14:* 49 (Jan.) 1938.
10. Faget, G. H., and Harmos, O.: Primary Carcinoma of the Lung, Virginia Med. Monthly *65:* 18 (Jan.) 1938.
11. Fried, B.: Bronchiogenic Carcinoma, Acta, Union internat. contre cancer *3:* 153, 1938.
12. Stein, J. J., and Joslin, H. L.: Carcinoma of the Bronchus, Surg., Gynec. & Obst. *66:* 902 (May) 1938.
13. Orton, H. B.: Bronchiogenic Carcinoma, Ann. Otol., Rhinol., Laryng. *47:* 795 (Sept.) 1938.
14. Nathanson, L.: Superior Pulmonary Sulcus Tumor Simulating Subacromial Bursitis, J. Bone & Joint Surg. *20:* 1028 (Oct.) 1938.
15. Stein, J. J.: Apical Lung Tumors, J. A. M. A. *111:* 1612 (Oct. 29) 1938.
16. Brunschwig, A., and Hamann, A.: Palliative Irradiation of Metastatic Tumors in the Lung, Read at Congress of American College of Surgeons, October 1938 (to be published).
17. Bartsch, H., and Waschner, G.: Herzgefaess-Schadigungen und ihre Prophylaxie, Strahlenther. *62:* 339 (June) 1938.
18. Gilchrist, R. A., and David, V.: Lymphatic Spread of Carcinoma of the Rectum, Ann. Surg. *108:* 621 (Oct.) 1938.
19. Keyes, H. B.: Carcinoma of the Rectum and Recto-sigmoid: Ligation of the Internal Iliac Arteries, Surg., Gynec. & Obst. *67:* 512 (Oct.) 1938.
20. Cattell, R. B.: Palliative Resection for Extensive Large Bowel Malignancy, Editorial, Surg., Gynec. & Obst. *67:* 370 (Sept.) 1938.
21. Hosler, R. M., and Murphy, J. A.: Two Cases of Malignant Perineal Tumor Simulating Inflammatory Lesions, Surgery *4:* 371 (Sept.) 1938.
22. Crile, G., Jr.: Successful Resection of the Head of the Pancreas for Carcinoma, Cleveland Clinic Quart. *5:* 250 (Oct.) 1938.
23. Kretschmer, H. L.: Multiple Primary Cancer, J. Urol. *40:* 421 (Sept.) 1938.
24. Leddy, E. T., and Desjardins, A. U.: Radiotherapy for Tumors of the Testis, Radiology *31:* 293 (Sept.) 1938.
25. Tucker, C. C., and Hellwig, C. A.: Proctologic Tumors, J. A. M. A. *111:* 1270 (Oct. 1) 1938.

PATHOLOGY

A recent report from the Mayo Clinic[1] of six cases of Hodgkin's disease localized in the stomach again calls attention to a diagnostic problem of interest to surgeon and pathologist alike. The relatively infrequent accounts in the literature doubtless undervaluate its actual occurrence. Many cases diagnosed as inoperable gastric carcinoma without biopsy or operation fall under this heading as well as occasional cases classified by the pathologist as atypical carcinoma or lymphosarcoma.

The usual clinical concept of Hodgkin's disease as a painless progressive enlargement of superficial or deep lymph nodes, with involvement of spleen, liver or bone marrow must be widened in scope. Cases previously regarded as medical curiosities are now considered manifestations of a widely occurring disease which includes any sites in which lymphoid tissue is present.

From a clinical diagnostic viewpoint a localized lymphogranulomatosis involving only the stomach would seem an insurmountable obstacle, showing little difference in symptomatology, roentgen and physical findings from a gastric carcinoma, ulcer or gumma. Less commonly cholecystitis, gastritis, or perigastric adhesion may be confusing. There are, however, a few observations which when a localizing diagnosis has placed the lesion in the stomach, may aid in differentiating it from carcinoma or ulcer; syphilis, of course, being ruled out by serologic tests, other stigmas of the disease or characteristic x-ray findings.

In the Mayo Clinic report all five of the six cases reported showed a gastric acidity within normal range. Severe anemia was absent in all cases and loss of weight was found to be a variable factor. In gastric carcinoma, achlorhydria is usually early and constant and the anemia apt to be severe. In fact some cases with severe anemia, no free hydrochloric acid and mild gastric complaints have been erroneously diagnosed and treated as pernicious anemia. Excess secretion of hydrochloric acid, periodic pain, and absence of anemia (unless bleeding is present) should serve in differentiating ulcer, providing, of course, carcinoma has not developed on an ulcer basis or vice versa. X-ray shows nothing characteristic about the stomach involved in Hodgkin's disease. With these considerations in mind, the surgeon when confronted with a gastric new growth at laparotomy may alter his course of treatment somewhat, depending on the gross pathologic picture with which he is confronted, though opinions vary regarding the course to pursue. Four of the Mayo Clinic cases had undergone partial gastric resections, one a total and one a simple excision of a lymphogranulomatous ulcer. Three

showed the lymph nodes involved at operation and of these two are living six and eight years after operation, the other died three months after operation.

Singer,[2] in reviewing six cases of Hodgkin's disease of the stomach in 1931 added one of his own involving the distal third of the stomach and perigastric glands which he claimed to be unique in the literature in that no evidence of any previous or associated lesion was present elsewhere in the body. This localization was substantiated by gross and microscopic examination at autopsy. He appends, however, a report by David of a lymphogranuloma of the stomach in which no associated lesions were noted at laparotomy. Despite this known tendency of Hodgkin's disease to invade the lymph glands widely, as well as other organs, and regardless of the short course of survival following operation of his reviewed cases, he advocates surgery as the method of choice.

Comando[3] later reported the case of a 27 year old male with a localized growth in the pyloric region making a good recovery following excision. He also advocated surgery for these cases. However, observations on the pathogenesis, spread, and biologic behavior to radiation therapy of Hodgkin's disease elsewhere in the body would indicate that this condition could be attacked from another angle. The earliest histologic changes[4] usually noted in Hodgkin's disease are proliferation of the reticulum cells in the germinal center or sinusoids of lymphoid nodules, as well as hyperplasia of the lymphoid cells and associated reduplication, though possibly not prominent, of the reticulum fibers. As the process evolves it gradually forms a polymorphocellular structure composed of varying quantities of lymphocytes, endothelial cells, eosinophils, polymorphonuclears, plasma cells, fibroblasts, reticulum and Sternberg-Reed cells, the picture varying somewhat according to the stage of the disease often showing a late dense fibrotic appearance. Regardless of whether this represents a granulomatous reaction in response to a virus[5,6] or other stimulus or a true neoplasm in the accepted sense of the word, the process is a widely invasive one readily involving both lymphatic channels and blood vessels. The capsules of lymph glands become penetrated forming adherent masses or invasion spreads in irregular fashion in the tissue adjacent to the primary site. Hence when infiltration of the stomach wall has become sufficiently advanced to cause symptoms it may readily have passed the boundaries of the stomach serosa to the adjacent nodes, peritoneum or to distant foci via the blood vessels.

Thus it would seem that the surgeon at laparotomy in palpating a diffusely thickened or irregular nodular stomach wall of elastic

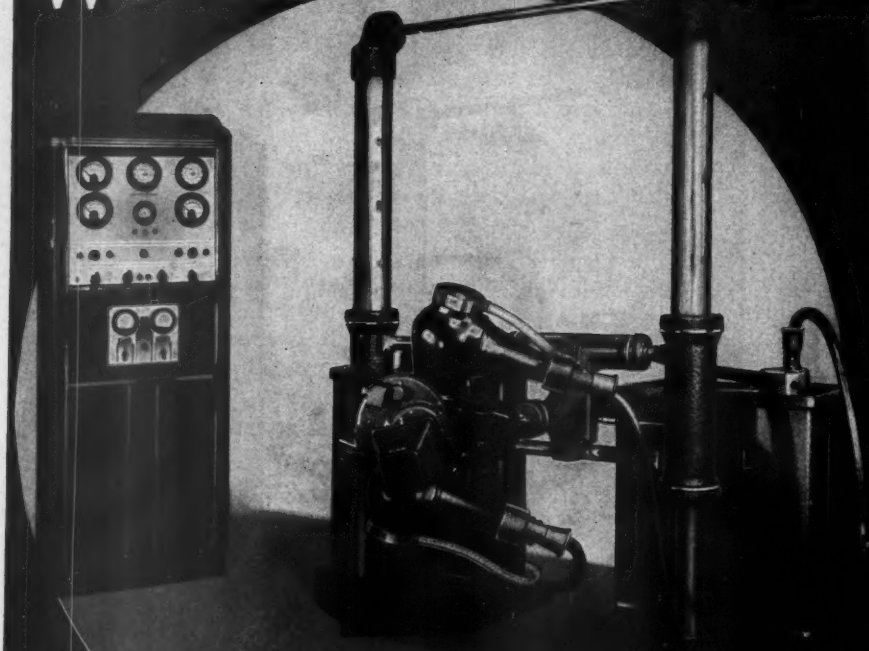
consistency with regional node involvement, rather than attempt a radical resection with the imminent dangers of such major protedures, would first extirpate a node for rapid histologic diagnosis before proceeding further. Subsequent radiation treatment in the event of a lymphogranulomatous lesion should prove as efficacious here as it has in other sites within the body[7] and entails none of the risks of a more radical procedure. Histologic diagnosis of the excised node may present difficulties even for the experienced pathologist, certain types of undifferentiated medullary carcinomas producing bizarre pictures requiring elaborate differential staining for exact diagnosis. Similarly certain lymphosarcomas may be indistinguishable histologically, but as with Hodgkin's disease their response to radiation is often favorable.

SEATON SAILER, M.D.

REFERENCES

1. Madding, G. F.: Hodgkin's Disease of the Stomach: Report of Six Cases, Proc. Staff Meet., Mayo Clinic *13:* 39 (Sept. 25) 1938.
2. Singer, H. A.: Primary Isolated Lymphogranulomatosis of the Stomach, Arch. Surg. *22:* 1001, 1931.
3. Comando, H. N.: Primary Isolated Lymphogranulomatosis of the Stomach, Arch. Surg. *30:* 228, 1935.
4. Wallhauser, Andrew: Hodgkin's Disease, Arch. Path. *16:* 522, 672, 1933.
5. Gordon, M. H.: Hodgkin's Disease: Pathogenic Agent in Glands and its Application in Diagnosis, Brit. M. J. *1:* 641 (April 15) 1933.
6. Van Rooyen, C. E.: Recent Experimental Work on Etiology of Hodgkin's Disease, Brit. M. J. *2:* 562 (Sept. 23) 1933.
7. Sailer, S.: Hodgkin's Disease in the Aged, Am. J. Clin. Pathology *6:* 241, 1936.

Westinghouse X-Ray



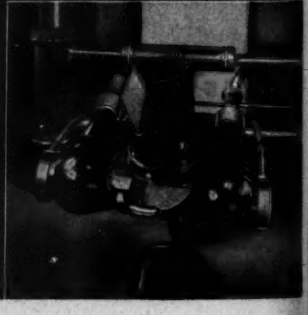
Maybe there is no such word as MANIPULABLE

But if not, it should be invented to describe the new monolock Duocondex. Its tubehead assumes any possible angle and position instantly, easily, exactly, and then three motions are rigidly locked with *one single lever*. A lever that snaps shut at the touch of the hand, conveniently located, never any awkward straining to reach across the table.

The Duocondex is now—optionally—built with oil immersed valves, shockproof, more compact, to permit single room or separate installation—whichever is preferable.

This brand-new model of a well proved, dependable deep therapy unit deserves your investigation of its many interesting details—as described in Bulletin No. 469. Westinghouse X-Ray Co., Inc., Long Island City, N. Y.

The new micro vernier control turns the tube without the slightest effort: locks it anywhere—automatically.



INDEX TO VOLUME VII

Book reviews are grouped together and are indexed under that heading in alphabetical order.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933.

Of The Southern Surgeon, published bi-monthly at Atlanta, Ga., for October, 1938. State of Georgia. County of Fulton. ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared Dr. B. T. Beasley, who, having been duly sworn according to law, deposes and says that he is the Managing Editor of the Southern Surgeon and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, The Southern Surgeon Publishing Co., 701 Hurt Bldg., Atlanta, Ga.
Editor, Dr. L. Minor Blackford, 104 Ponce de Leon Ave., Atlanta, Ga.
Managing Editor, Dr. B. T. Beasley, 701 Hurt Bldg., Atlanta, Ga.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) The Southeastern Surgical Congress, 701 Hurt Bldg., Atlanta, Ga., non-profit scientific organization (official organ).

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

B. T. BEASLEY, M. D., Managing Editor.

Sworn to and subscribed before me this 7th day of October, 1938.

MARGARET H. CHAPMAN.
(My commission expires April, 1939.)

Volume VII December, 1938 Number 6

The Southern Surgeon

Published Bi-monthly
By
THE SOUTHERN SURGEON PUBLISHING CO.
701 Hurt Building
Atlanta, Ga., U.S.A.

Entered as Second-Class Mail Matter July 24, 1936, at the Post Office at Atlanta, Ga., Under the Act of March 3, 1879.

Fig. 1. Lancet: stainless steel, triangular pointed, kept constantly sterile as it is made integral with cap of vial containing B-P Germicide. Designed to effect uniform depth and area of puncture. Will stand in upright position on table.

Fig. 2. Pipettes are securely mounted between rubber faced spring compression plungers and set facings.

Fig. 3. "Correction Factor" certificate attached to each B-P Pipette to facilitate greater accuracy and convenience in interpretive calculation.

THE BARD-PARKER HEMATOLOGICAL CASE

At last provisions have been made for collectively and compactly carrying the numerous easily-mislaid-or-forgotten pieces of equipment necessary for obtaining blood for red, white and differential blood count at the bedside . . . and the secure and convenient conveyance of the diluted blood and blood smears to the office or laboratory.

FEATURED with this ideal Case are the new "C.F." (Correction Factor) re-tested Bard-Parker Pipettes. To each pipette, registered by number (Fig. 3) is attached a re-test certificate giving the "correction factor" invaluable in obtaining greater interpretive accuracy. Pipettes are re-tested so that resulting calculations may be reduced to a common basis for comparative purposes, thus eliminating the differential errors up to 10% (± 5%) for red cell and 7% (± 3.5%) for white cell, allowable under U. S. Bureau of Standards specifications. Pipette mountings (Fig. 2) serve as a seal against leakage and markedly reduce the possibility of breakage.

PRICE, complete $7.50

Individual re-tested Bard-Parker "C.F." Pipettes (red or white) with correction factor certification, mouthpiece and tube, $1.25 ea.

Ask Your Dealer

PARKER, WHITE & HEYL, INC.
DANBURY CONNECTICUT

B-P
A BARD-PARKER PRODUCT

FOR BEST RESULTS IN X-RAY THERAPY

Hospitals Require Equipment Commensurate with the Broad Knowledge and Skill of the Roentgenologist

ONTINUALLY enriched in the knowledge of his profession, the roentgenologist approaches therapeutic problems with confidence. But a hindrance to the achievement of results comparable with the best reported in his field, is inadequate equipment. Antiquated equipment, inefficient equipment, can only serve to retard progress – to withhold therapeutic results far short of today's possibilities. ¶ The roentgen profession itself has decreed the requirements in equipment for modern x-ray therapy – has inspired the development and design of the new and more efficient apparatus now available. The hospital offering a high-voltage x-ray therapy service should, in justice to its roentgenologist, see that he is equipped with apparatus that fulfills present-day requirements, to further assure patients the full benefits of his knowledge and skill. ¶ Recognizing its share of responsibility, the General Electric organization has, in collaboration with the profession, developed a series of high-voltage units – the Maximar series – which merit consideration in any plans for x-ray therapy service. These famous Maximar units, used the world over, have established performance records for unusually high efficiency, reliability, and economy of operation second to none. ¶ It will pay you to investigate a Maximar installation, scientifically planned for your specific requirements by an experienced staff of layout engineers. Write and ask for their help.

GENERAL ELECTRIC X-RAY CORPORATION
2012 JACKSON BOULEVARD CHICAGO, ILLINOIS

Photograph above shows partial view of Johnson Suture Corporation Building, 2212 South LaSalle Street, Chicago, Ill. This is a wholly-owned subsidiary of Johnson & Johnson.

The house... *"built on a rock"*

YEARS ago Johnson & Johnson discovered that partial control of suture production was comparable to the stability of the house "built upon the sand."

In 1921, in the Chicago packing house district, the plant pictured above was established. From daily receipt of raw sheep's intestines to final sterilization every step in the production of Johnson & Johnson Catgut is under the control of the company's own scientists, executives and craftsmen.

Economically, a surgical catgut manufacturing operation cannot exist without an outlet for tennis gut, because a large proportion of the raw sheep gut is not adaptable to surgical catgut manufacture. Therefore, at the J & J plant this material is fabricated into Johnson's Chrome Twist, used by many leading players.

For surgical catgut, J & J maintains a full-time scientific staff which is constantly engaged in extensive research work.

This single ownership-control of every step of manufacture gives the surgeon the benefit of an excellent finished product, produced under rigid laboratory supervision and by exclusive methods.

Johnson & Johnson

NEW BRUNSWICK, N. J. CHICAGO, ILL

MANUFACTURERS OF SURGICAL SUTURES SINCE 1887